

New York State Museum
Annual report
31(1877)

THIRTY-FIRST ANNUAL REPORT

EDWARD M. KINDLE
VICTORIA MEMORIAL MUSEUM ON THE
OTTAWA, CANADA.

NEW YORK STATE MUSEUM OF NATURAL HISTORY

BY THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

[EX-OFFICIO TRUSTEES OF THE MUSEUM.]

TRANSMITTED TO THE LEGISLATURE APRIL 17, 1878.

ALBANY :
CHARLES VAN BENTHUYSEN & SONS.
1879.

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IN SENATE,

APRIL 18, 1878.

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REGENTS OF THE UNIVERSITY OF THE STATE OF NEW
YORK.

UNIVERSITY OF THE STATE OF NEW YORK: }
OFFICE OF THE REGENTS, }
ALBANY, April 16, 1878. }

To the Hon. WILLIAM DORSHEIMER,
President of the Senate:

SIR—I have the honor to transmit the Thirty-first Annual Report on the State Museum of Natural History by the Regents of the University.

I remain, very respectfully,

Your obedient servant,

E. C. BENEDICT,

Chancellor of the University.

REGENTS OF THE UNIVERSITY.

[*Ex-Officio Trustees of the State Museum of Natural History.*]

ERASTUS C. BENEDICT, LL. D., CHANCELLOR.
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DANIEL J. PRATT, PH. D., ASSISTANT SECRETARY.

STANDING COMMITTEE OF THE REGENTS:

(*Specially charged with the care of the State Museum, 1878.*)

THE VICE-CHANCELLOR,	MR. RANKIN.
THE SECRETARY OF STATE,	MR. TOWNSEND.
THE SUPT. OF PUBLIC INSTRUCTION,	MR. BOSTWICK.
MR. CLINTON,	

Director of the State Museum:

JAMES HALL, LL. D.

Assistants in the Museum:

J. A. LINTNER, ENTOMOLOGY AND GENERAL ZOOLOGY.
CHARLES H. PECK, BOTANY.
DR. R. FRITZ-GAERTNER, MINERALOGY,
JAMES W. HALL, OSTEOLOGY AND PREPARATION OF ROCK SECTIONS.

REPORT.

To the Honorable the Legislature of the State of New York :

The Regents of the University, as Trustees of the State Museum of Natural History, respectfully submit this their Thirty-first Annual Report :

The reports of the Director and of the Botanist, hereto appended, exhibit the condition of the Museum and the work of the year. In the department of Paleontology large collections have been made, principally of the corals.

The work of preparing sections of fossils for exhibiting their internal structure has been very successfully prosecuted. These sections, made very thin, may be photographed, and, by the stereopticon, shown on a screen in very impressive forms. It is believed that the success of this work in the Museum is more positive than had been elsewhere secured.

The arrangement of the collections in nearly all the departments has been perfected, and it is believed to be all that can be desired for the purposes of study.

Attention is specially called to the importance of printing the reports on the Museum soon after they are presented to the Legislature. These reports embody important scientific facts, and results of investigations are earnestly sought for by citizens of the State, and are profitably used in exchange with individuals and societies in other States and in foreign countries. Their value is greatly diminished by delay of publication.

All of which is respectfully submitted.

By order of the Regents,

E. C. BENEDICT,

Chancellor of the University.

S. B. WOOLWORTH,

Secretary.

REPORT ON THE STATE MUSEUM.



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REPORT OF THE DIRECTOR.

ALBANY, *January, 1878.*

To the Honorable the Board of Regents of the University of the State of New York:

GENTLEMEN—I have the honor to communicate herewith the Annual Report upon the State Museum of Natural History, embracing a statement of the conditions of the collections in the several departments; the additions made thereto; and the work done in the institution and in field collections during the past year; together with special communications upon subjects under investigation by the persons connected with the Museum.

In every department the collections of the Museum are in good order and condition, and every available space is filled; and in many instances so crowded as to interfere with the proper exhibition of the specimens. For the geological and palæontological collections alone, we need an additional area equal to another floor of the present building. Since, therefore, the collections made and studied cannot be placed on exhibition with the present accommodations, it should be remembered that it becomes quite impossible to present to the Board of Regents, or to the public, the evidences of work accomplished.

The changes authorized to be made upon the upper floor of the Museum have afforded space for the arrangement of the additions to the zoölogical collections mentioned in my report of last year; and the skins of Walrus and young, the Giraffe, the Rhinoceras and skeleton; the latter having been placed in position within a few months past.

These changes, however, do not leave sufficient space for the exhibition of the ethnological and historical collections, a considerable part of which remain packed, or laid in drawers.

The present disposition of these collections will be given under the proper head.

DISTRIBUTION OF DUPLICATE FOSSILS AND MINERALS.

The occupation of the Agricultural Hall by the census department, in 1876, interrupted the work then in progress, and has since prevented anything from being done in the actual arrangement for distribution of the duplicate collections; but the preparatory labor of cleaning, ticketing and recording specimens, has been constantly going on in another building appropriated for that purpose; and these collections will be available whenever time and opportunity shall be offered for their final disposition.

Of the collections previously prepared by the Museum for distribution to the institutions of our State, but one has been sent out during the past year. A request for a collection made by the Alfred University, of Alfred, N. Y., accompanied by the statement that they were prepared to receive it, having been approved by the Board of Regents, there was forwarded to that University, in January last, a collection of over five hundred labeled and catalogued fossils and minerals.

There are still eight arranged and labeled collections remaining in the Museum, which properly should be distributed as soon as they can be placed in

institutions where they will be appreciated, and used for the advancement of the sciences which they illustrate.

MUSEUM PUBLICATIONS.

The only publications made during the year are the following papers by Mr. C. D. Walcott, special assistant, published in advance of the Museum report and included in the present communication.

Notes on Sections of Trilobites from the Trenton Limestone. 6 pp., 1 pl.

Note upon the Eggs of the Trilobite. 3 pp.

Descriptions of New Species of Fossils from the Chazy and Trenton Limestones. 7 pp. (Describes eight species of Trilobites.)

It is a matter of deep regret to the Director and to all interested in the institution, that the publication of the annual reports of the Museum, which had been continued without interruption for more than a quarter of a century from the first issue in 1848, should have been for the last three years omitted. The twenty-ninth and thirtieth reports, for the years 1875 and 1876, have not yet been printed, even as a State document. Of the twenty-eighth report, for the year 1874, only the usual documentary edition was printed, and for the few copies of this report which we have been able to distribute (about fifty), we are indebted to the kindness of the Secretary of State. Some copies have also been obtained at the office of the Secretary of State, on personal application, by parties desiring to obtain them.

The comparatively small number of copies of the reports, which the Legislatures had annually directed to be printed for the use of the Regents of the University and for the Museum, has been entirely suspended for the past four years.

The value of these reports is sufficiently attested by the numerous applications made for them, and the character of the sources from which these applications are received. The editions issued have speedily been exhausted or so diminished in number that very few remain. Every effort has been made to sustain the reputation and character of these reports. Not one has been presented, of late years, which does not contain papers which are valuable contributions to science, and the result of original investigation. The non-publication of these reports cannot but operate seriously to the disadvantage of the Museum. No such institution, at the present day, can have a position in the world of science, which it does not command by the actual work it accomplishes; and deprived of publication, it is essentially deprived of almost its only means of communication with the scientific public. Even delay in publication is often an injustice to an author, whose rightful priority is superseded by another who has earlier facilities of announcement.

ADDITIONS TO THE MUSEUM BY DONATION.

The donations made to the Museum during the past year have not been as many as usual.

To the Botanical department, twenty-one contributions have been made of (in the aggregate) two hundred and sixteen species.

To the Zoological department contributions have been made by twenty donors of one hundred and fifteen specimens.

To the Geological and Mineralogical departments, there have been eight contributors.

To the Archaeological department, two contributions are recorded.

To the Library, contributions have been made from twenty-three individuals and societies, of forty-seven pamphlets, and twenty-three bound volumes.

The whole number of contributors to the several departments and the Library is seventy-four.

THE WORK OF THE MUSEUM.

Botany. In the Botanical department, a special report on the subject of his investigations will be made by the botanist, Mr. C. H. Peck.

Zoölogy. The collections in this department having been nearly all arranged in preceding years, we have not much special work upon them to report for the last year. Of the donations, several specimens have been mounted, and, together with the others of value, added to the collections. A number of Reptilia in alcohol, principally from the Southern States, have been determined and labeled; and all the alcoholic specimens of reptiles and fishes not belonging to the New York fauna, have been separately arranged in one of the wall-cases.

Geology and Mineralogy. The labeling of the Museum collections, preparatory to the compilation and publication of a general catalogue, has been continued through the year.

The geological collections contained in the wall-cases have been re-arranged, and labeled as far as the Devonian rocks. For want of other space, these cases have frequently been made the receptacle for rock specimens, without due regard to their value. The removal of all specimens not important to the completeness of the series has relieved the over-crowded cases, and made room for the proper exhibition of the collections. Each specimen is now accompanied by a card-label, indicating its name, geological position and locality; and a transcript of the card is attached to the specimen. The specimens withdrawn from the cases have been placed in drawers beneath the table-cases, with memoranda of their removal.

The mineralogical specimens were arranged and properly labeled during the previous year (1876). During the past year, a large number of minerals have been incorporated in the general collection, derived from a more critical examination of specimens which had been laid aside as duplicates from collections made in the field, and from various contributions; notably one from Prof. Albert R. Leeds, of beautiful and valuable specimens from Bergen Tunnel, and other localities in New Jersey and Pennsylvania.

After the selection from the duplicate minerals, the remainder have been arranged in drawers within the enclosure on the second floor, in two series: the first in sixty-five drawers beneath the tables, in which are all those of known localities; second, in the case of trays in the same enclosure, containing all those of unknown localities, the larger number of which are from the old collections of the Museum, which have been obtained from various sources, many of them being of little value.

In the Van Rensselaer collection, presented to the Museum in 1872, to which reference has heretofore been made, there were a large number of volcanic specimens, which had undoubtedly been collected with a view of presenting a full representation of the Vesuvian products. These have been arranged in four table-cases on the second floor of the Museum, with labels indicating the contained minerals, so far as they have been determined.

Four additional table-cases on the second floor contain an arranged collection of claystones; a series of Cumberland, Eng. rocks, and miscellaneous rock specimens of the Brazilian collection. The drawers beneath these cases contain Jurassic and Cretaceous fossils, which have been mainly derived from the Van Rensselaer collection, and not previously arranged.

The collection of minerals, chiefly crystals, formerly belonging to Dr. E. Emmons, which was purchased some years since by Hon. Erastus Corning, and deposited in the Museum, has been obtained and added to the Museum collections, by the payment of its original cost from the Museum appropriation.

Palaeontology, etc. The Palaeontological series, through the lower and upper Silurian and Devonian formations, has been reviewed and in part re-arranged; some errors in determination have been corrected; and fifty labels changed in conformity to the present nomenclature. A few additions have been made to the collections in the cases.

On the second floor the collection of British fossils, of the Silurian, Devonian, Carboniferous, Permian, Triassic, Jurassic, Cretaceous and Tertiary formations, have been rearranged in the table-cases; and fossils of the same formations which had occupied eighteen drawers have been incorporated with them, filling the entire space; while the remaining part of the Jurassic and Cretaceous fossils are arranged in drawers beneath the table-cases.

Three additional table-cases, mainly filled with arrow-heads, have been added to the collection of stone implements. The entire collections of this character now occupy fourteen table-cases.

MECHANICAL FACILITIES FOR WORK IN THE MUSEUM.

The importance of a more thorough knowledge of the structure of rocks, minerals and fossils than can be obtained by superficial examination, even when aided by an ordinary magnifier or microscope, has long been felt in the course of our Museum work. This has been found especially true in the study of the fossil Sponges, the Bryozoa, in all forms of Corals, the shells of Brachiopoda, etc. Even where minute or microscopic structure is not sought for, as in the Cephalopoda and other forms, means for examining the interior structure by artificial sections is of the utmost importance.

To accomplish this work, a small turning-lathe had, during the year 1876, been arranged in one of the basement working-rooms, but it required excessive labor and a wasteful expenditure of human strength to accomplish even a moiety of the work needed. Upon application to the Board of Regents, in 1877, I was authorized to purchase and place in this working-room a small steam-engine, with the necessary apparatus for cutting and polishing specimens. The whole has been established, and has been working in a most satisfactory manner since May last. The work accomplished has been of various kinds, including specimens from all the classes mentioned above, but chiefly Sponges, Bryozoa, Corals and Brachiopoda. These have been cut in thin sections, polished and attached to glass plates, and ground down so as to be translucent or semi-transparent, and are thus fitted for microscopic slides, or for a critical examination under an ordinary magnifier.

The value and importance of this work cannot be too highly estimated. With our present facilities, we are able in a few hours to obtain translucent sections of any fossil form, cut from the original body in different directions, and presenting the details of structure far more perfectly than could be obtained by any other process. The same is also true of rock specimens and minerals, where the structure is brought out in a most satisfactory manner.

The specimens thus prepared are susceptible of being photographed, and are reproduced in great exactness by the Albertype process. Some examples of this mode of representing the minute structure of fossil sponges have already been laid before you. Other specimens are illustrated in the volumes entitled "Illustrations of Devonian Fossils," published in 1876. The absolute accuracy obtained by this process renders it of the utmost value, as it precludes any chance of misrepresentation.

This process of preparation of rock specimens has been long in use in the laboratories of Europe; and in the hands of Professor Zirkel, of Leipzig, and others, has contributed most important results to our knowledge of petrology.

The same processes have been adopted in some of the museums and laboratories of our own country, and especially by Dr. J. J. Woodward, in the study of the tissues of living forms, in the Museum attached to the War Department in Washington. Much work of similar character has also been accomplished in the Museum of Comparative Zoölogy at Cambridge, Mass.

In our own case, it has already proved of invaluable service, and promises to be still more important in future investigations. Up to the present time, sections have been made of rocks, minerals and fossils, numbering over 560, of which more than 325 are polished, translucent cuttings of large size, and adapted to microscopic study and photography. This work has been under the charge of Dr. J. W. Hall, who has devised and arranged the machinery now in use. Among this collection are a considerable number of specimens of *Tentaculites*, *Stromatopora* and European *petrospongia* which have been prepared by Dr. Fritz-Gaertner. Each one of the sections has been carefully recorded, noting the locality and geological formation. A catalogue of these specimens has been prepared, containing all the information possessed regarding the specimens at the time the work was done, indicating its geological position and the place in the Museum of the specimen from which the sections have been cut, and bearing a number corresponding to the section.

In continuing this work, it is intended to prepare a series of cuttings of specimens representing all the varieties of rock formations within the State of New York, as well as of those fossil forms where such treatment will elucidate their intimate and characteristic structure.

In speaking of this subject, I should not omit an important feature in the application of these preparations to educational uses. The translucent sections attached to glass by Canada balsam, are not only susceptible of being photographed and printed from the glass plate, but these plates may be used in the stereopticon or magic lantern, and the figures, projected upon a screen, magnified to any desired degree; thus affording the student an opportunity of learning, in a general way, the structure of any class of objects which cannot be advantageously studied from the exterior characters.

FIELD COLLECTIONS OF FOSSILS AND MINERALS.

The accumulating collections of rocks and fossils, resulting from the field-work of the Museum, have been temporarily placed in a building especially devoted to preparatory work upon the same. Here the fossils of the lower Helderberg group, Oriskany sandstone, Upper Helderberg, Hamilton, Portage and Chemung groups, were first separated and arranged, this work occupying four or five months; subsequently the *Brachiopoda* of the Hamilton and Chemung groups, and the *Lamellibranchiata* of the Hamilton group, have been carefully separated, and notes made upon each species. In a book arranged for that purpose, the record of every species is given, as to the number of specimens from each locality, the condition of preservation, the character of the rock, its manner of weathering and consistency, and also the associated species. The arrangement of the *Lamellibranchiata* of the Hamilton group is nearly completed, but it will require several months longer to finish the fossils of the order from the Chemung group. This work has been done by Mr. Lee E. Brown.

The object of this work is to give a comprehensive view of the comparative abundance of each species, its geographical distribution and vertical range, and the character of the sediment in which it lived. The notes mark the peculiarities or characteristics of particular specimens or of the species itself. When completed, this work will be especially important in showing the geographical range of species; and the results may be represented on any geographical or geological map of the State.

From the amount of work necessary to be done upon the fossils collected during the year, in their preparation, determination, labeling and recording, before incorporating them with the collections, they cannot now be included in the list of additions herewith presented, except in a very general statement. I can only say of them at the present time, that they are of great value and importance to the Museum, and in their extent surpass the collections of many of the previous years.

The following statement will, in some measure, indicate the nature of the material and the quantity collected during the past year.

Mr. C. D. Walcott with Mr. C. Vandelooy were occupied for a considerable time in making Collections from the coralliferous limestone of Western New York. The results are as follows: From Caledonia, N. Y., four barrels and two boxes; from Leroy, ten barrels; from Falkirk, three barrels. These collections are chiefly of fossil corals which are in a good state of preservation.

For the purpose of comparison with the New York forms, five barrels of corals were collected from the limestone of the same horizon, in Southern Indiana. At Pendleton, Ind., a sandstone at the base of the coralliferous limestone, bears a fauna which is characteristic of the Schoharie grit of New York; and from this formation were obtained three barrels of specimens. Besides these, an extensive collection was made from the Niagara group, at Waldron, Ind., of about 7,000 pounds. This will be a very valuable addition to the Museum, since the beds of corresponding age at Lockport, N. Y., are now difficult of access.

Dr R. Fritz-Gaertner has collected four boxes of minerals and fossils in the valley of the Mohawk. The fossils are from the Calceiferous sandstone, Birdseye and Trenton limestones. From the Trenton limestone the fossils are chiefly minute bryozoans, which will be an important addition to the Museum collections. The minerals derived from the calciferous sandstone are quartz crystals in druses, with rhombohedral forms of calcite and indurated bitumen; pyrites and sphalerite. The Trenton limestone furnished large specimens of galenite and pyrites, the sphalerite and calcite coming together in veins. Several instructive specimens of slickensides were likewise derived from the same locality.

Dr. J. W. Hall has collected sixty-four boxes of fossils, which are nearly all in a good state of preservation. The collections were made in the counties of Albany, Schoharie, Otsego and Onondaga. They consist, principally, of fossil corals, derived from the upper Helderberg limestone formation. Some new and valuable collections were made from the goniatite limestone; and a large collection of Lamellibranchiata and other shells from the Hamilton group of Onondaga county.

It would be quite impossible to enumerate in detail all the work done in the Museum. In an institution like this, open at all times to visitors, much time of the assistants and often of the Director is occupied in answering questions or giving information. Specimens in every department of Natural History are sent in with inquiries regarding their nature and value; and the information thus asked is always cheerfully given. It has been my earnest desire to make the Museum not only a scientific organization in the true sense of the term, but at the same time an educational institution of the higher order in all the departments of science represented therein. The work is carried on not only for present use and needs of the Museum, but with a view to the future, and it is believed that the work done and the collections accumulated will be so arranged and placed in such a condition, that they will be available and their value will be appreciated in all the future working of the institution.

I am, very respectfully,

Your obed't servant,

JAMES HALL.

ADDITIONS TO THE STATE MUSEUM

DURING THE YEAR 1877.

I. BOTANICAL.

Specimens of sixteen species of California plants. From Miss S. P. MONKS, Coldspring, N. Y.

Five specimens of Ferns; among them *Botrychium lunaria* Sw. From Mrs. S. M. RUST, Syracuse, N. Y.

Twenty-eight species of plants; most of them "ballast" plants, from near Philadelphia. From J. C. MARTINDALE, Camden, N. J.

Specimens of the yellow pine—*Pinus mitis* Mx. From N. L. BRITTON, New Dorp, N. Y.

Forty-six species of plants; one of them a new and rare fungus. From E. S. MILLER, Wading River, N. Y.

Eleven species of Mosses and Fungi, mostly from Colorado. From E. A. RAU, Bethlehem, Pa.

Four species of Fungi. From W. R. GERARD, New York city.

Nine species of plants. From Rev. H. WIBBE, Oswego, N. Y.

A specimen of *Carex panicea* L. From Prof. P. A. PUISSANT, Troy, N. Y.

Four species of Ferns; among them *Scolopendrium vulgare* Sm. From L. M. UNDERWOOD, Syracuse, N. Y.

A specimen of *Arthonia polymorpha* Ach. From H. WILLEY, New Bedford, Mass.

Fourteen species of plants; some of them new species. From Hon. G. W. CLINTON, Buffalo, N. Y.

Twelve species of Fungi. From C. C. FROST, Brattleborough, Vt.

Six species of Fungi; some of them new. From H. A. WARNE, Oneida, N. Y.

Four species of Ferns. From B. D. GILBERT, Utica, N. Y.

Five species of plants; among them the rare *Pogonia affinis* Aust. From M. W. VANDENBERG, Fort Edward, N. Y.

A specimen of *Polyporus Beatiei* Bann. From G. S. WATKINS, Wilmust, N. Y.

Specimens of *Polyporus Beatiei* Bann. and *Impatiens fulva* Nutt. From G. T. FISH, Rochester, N. Y.

Forty-three species of Fungi, from New Jersey. From J. B. ELLIS, Newfield, N. J.

Specimen of the wood of *Kalmia latifolia* L. From C. DEVOL, M. D., Albany, N. Y.

Specimens of California hickory nuts. From P. C. BROWER, Albany, N. Y.

II. ZOÖLOGICAL.

- A Field-mouse. From ANDREW M. BENDER, Adamsville, N. Y.
- A Woodchuck—*Arctomys monax* (Linn.). From SETH E. PARSONS, Albany, N. Y.
- A New York Ermine (*Putorius Noveboracensis*). From JOHN H. BURNS, Cedar Hill, N. Y.
- A Northern Tree-toad—*Hyla versicolor* Le Conte, taken at Center, N. Y., feeding on the sugar-bait spread on pine trees for Lepidoptera. From W. W. HILL, Albany, N. Y.
- A large slug—*Tebennophorus* ——sp? from a cellar of a house in Albany. From W. W. HILL, Albany N. Y.
- A Pickerel—*Esox reticulatus* Le Sueur, 45 inches long, weighing 19 pounds, taken on Friend's Lake, Chester, Warren Co., by Mrs. H. A. Ferguson of Troy, N. Y. From Mrs. FERGUSON.
- A fish from Banda Sia; a Snake, known as "Kntonki" by the natives. Sunda Dio, Java. Four examples of Medusæ, from the North Pacific Ocean. From HOWARD TREADWELL, Albany, N. Y.
- A scarlet Tanager—*Pyrranga ruber* (Linn.)—shot in Bainbridge, N. Y., Aug. 13th. From G. A. DODGE.
- A humming-bird—*Trochilus colubris* (Linn.). From S. BIRCH, Albany, N. Y.
- A red-tailed Buzzard—*Buteo borealis* (Gm.) Vieill—of 50 inches expanse of wings. From E. E. WANDS, New Scotland, N. Y.
- A Butcher-bird—*Colluris borealis* (Vieill) Bd.—said to have killed a number of pigeons. From Miss AMELIA HARTMANN, Watervhet, N. Y.
- A hen's egg of abnormal form. From JOHN O'HARE, Albany.
- An egg of very elongate form from a black Spanish hen. From WM. J. ROSS, Albany, N. Y.
- An egg-yolk of solid consistence and sublaminate structure, and entirely destitute of an albuminous envelope; dropped in this condition by a white Leghorn hen. From WM. P. BUELL, JR., Albany, N. Y.
- A case containing *Vespa diabolica*, *Halictus ligatus*, *Pelopæus cæruleus*, *Ceratina dupla*, and other Hymenoptera. (About 50 species in 74 examples.)
- Twelve specimens of Hymenoptera (nine species), viz. :
Apis mellifica Linn., ♂, ♀, ♀; *Megachile femorata* Say; *Andrena vicina* Smith; *Pompilus ?atrox* Dahlb.; *Vespa crabro* Linn., Kings Co., N. Y.; *Sphex Pennsylvanica* Linn.; *Sphex ichneumonæa* F., Fishers' Island, N. Y.; *Melissodes pruinosa* Say; *Melissodes binotata* Say, ♂, ♀.
- Vertebral joint, detached spinal process and two epiphyses of a fin-back Whale, stranded at Fisher's Island in 1870. From Rev. J. L. ZABRISKIE, New Baltimore, N. Y.

- An Owl-Beetle—*Alans oculatus* (Linn.). From THOMAS DOYLE, Albany.
- A Pine-Beetle—*Monohammus titillator* (Fabr.). From JOSEPH FRY, Albany, N. Y.
- A Cecropia Moth—*Samia Cecropia* (Linn.). From FREDERICK FINK, Albany, N. Y.
- A shell from Syria (undetermined). From Miss E. E. DICKINSON, Schenectady, N. Y.
- Skeleton of a Rhinoceros—*Rhinoceros Indicus* L.—mounted by Prof. H. A. WARD, Rochester.
- An American Goshawk—*Astur atricapillus* (Wils.) Jard., shot in New Scotland December 30. From JOHN L. MOAK, New Scotland.
- A Gold-Fish—*Cyprinus auratus*—in a new preservative liquid. From ERASTUS CORNING, JR., Albany.

• III. GEOLOGICAL AND MINERALOGICAL.

- A rolled specimen of Hamilton sandstone, composed mainly of *Spirifera granulifera* Hall. From J. H. BROOKS, Albany, N. Y.
- Chonetes lycoperdon*; calcareous concretions around rootlets, and a concretion in slate. From EDWARD CHANDLER, Fort Plain, N. Y.
- A block of Marmolite; a block of Dolemite, with Tale in Clinocllore; a block of Magnetite. From the Tillie Foster Iron Mine, Putnam county, near Brewster's, N. Y. From Prof. JAMES HALL.
- A block of Calcite, with groups of crystals; Mineville, Essex county, N. Y. Purchased for the Museum.
- Nineteen species of minerals, viz.: Calamine, Franklin, N. J.; Franklinite, Franklin, N. J.; Willemite, Franklin, N. J.; Stilbite, Bergen Tunnel; Natrolite, Bergen Tunnel; Datholite, Bergen Tunnel; Anthophyllite, Bucks county, Pa.; Pectolite, Bergen Tunnel; Clinocllore, nr. Westchester, Pa.; Nemalite, Hoboken, N. J.; Vermiculite, Conshocken, Pa.; Jefferisite, nr. Westchester, Pa.; Marmolite, Hoboken, N. J.; Hydromagnesite, Hoboken, N. J.; Oligoclase, Bucks county, Pa.; Oligoclase, nr. Westchester, Pa.; White Quartz, Bergen. N. J.; Calcite, Bergen Tunnel; Celestite, Tyrone, Pa. From Prof. ALBERT R. LEEDS, Stevens' Institute of Technology, Hoboken, N. J.
- Sphalerite and Galenite, Spraker's Basin, N. Y. By collection of Dr. R. FRITZ-GAERTNER.
- Specimens of *Atrypa reticularis*. From N. B. WHEELER, West Winfield, N. Y.
- ^ Ten specimens of *Saxicava rugosa*, of the Champlain epoch, Clinton county, N. Y. From G. P. CHAPMAN, Albany.

IV. ARCHÆOLOGICAL

- A collection of arrow-heads (principally of flint), made at Loudonville, Albany county, N. Y., consisting of ninety-four examples (fifty-one perfect or nearly so); four knives, imperfect; a fragment of stone utensil; chips from the manufacture of the flint implements. From F. E. ASPINWALL, M. D., Loudonville, N. Y.

Nine pieces of pottery, and jaw-bone of deer and other bones of deer, collected at Minden, Montgomery county, N. Y., on the site of ancient Indian villages. Cast of a stone Totem, believed to represent the Tribe of the Bear of the Mohawks, found in Root, Montgomery county, N. Y. (see figure in *American Naturalist*, Vol. xii, p. 779). From A. G. RICHMOND and S. L. FREY, Canajoharie, N. Y.

V. TO THE LIBRARY.

1. BY DONATION.

Laws of the State of New York, passed at the Ninety-ninth Session of the Legislature. 2 Vols. Albany: 1876. From the REGENTS OF THE UNIVERSITY.

Annual Report of the Department of Mines, New South Wales, for the year 1875. Sydney: 1876. sm. 4to, pp. 167.—Mines and Mineral Statistics of New South Wales, etc. By Hon. John Lucas, M. P. Sydney: 1875. 8vo, pp. 252.—New South Wales, its progress and Resources. By authority of the Commissioners. Sydney: 1876. Pamph., 12mo, pp. 31.—Mineral Map and General Statistics of New South Wales. Sydney: 1876. Pamph., 12mo.—New South Wales, the Oldest and Richest of the Australian Colonies. By Charles Robinson. Sydney: 1873. Pamph., 12mo, pp. 110. From Dr. R. W. FORBES, New York.

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From the AUTHOR.

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- Transactions of the Wisconsin Academy of Science, Arts and Letters. Vol. III. 1875-76. Madison: 1876. 8vo., pp. 269. From the ACADEMY.
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- A Brief Comparison of the Butterfly Faunas of Europe and Eastern North America. By Samuel H. Scudder. Pamph., 8vo., 6 pp.
- Antigeny, or Sexual Dimorphism in Butterflies. By Samuel H. Scudder. [From Proc. Amer. Acad. Arts-Sciences, XII, pp. 150-158. 1877.]
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From det KONGELIGE NORSKE UNIVERSITET I CHRISTIANIA.

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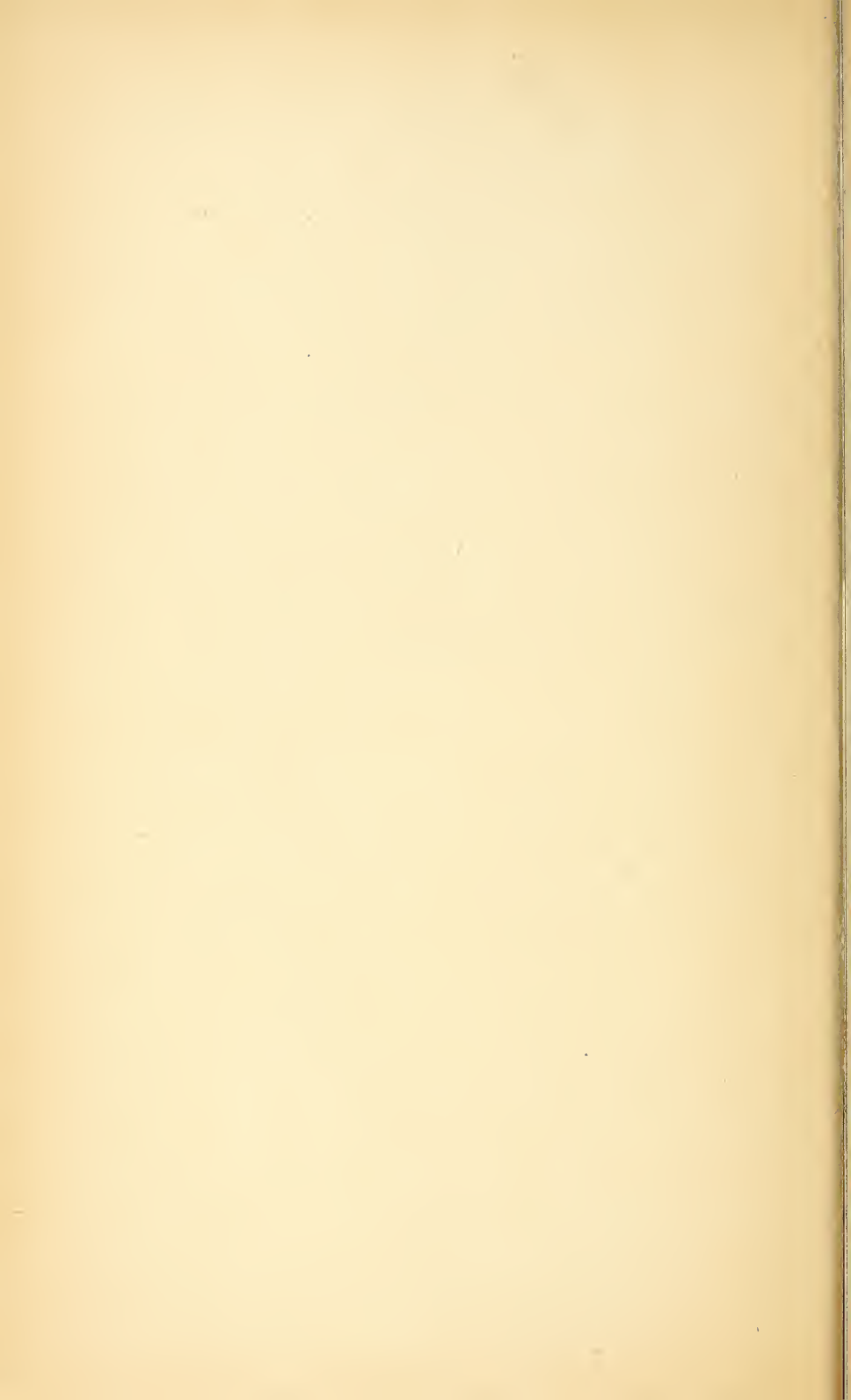
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REPORT OF THE BOTANIST.

S. B. WOOLWORTH, LL. D.,

Secretary of the Board of Regents of the University :

SIR—Since the date of my last report, specimens of one hundred and eighty-nine species of plants have been mounted and placed in the Herbarium of the State Museum of Natural History, of which one hundred and sixty-two were not before represented therein. Twenty-seven are improved specimens or new varieties not before represented. A list of the specimens mounted is marked (1).

Specimens have been collected in the counties of Albany, Columbia, Delaware, Essex, Rensselaer, Saratoga, Schoharie and Ulster. These represent one hundred and twenty-seven species new to the Herbarium, fifty-eight of which are believed to be new or hitherto undescribed. A list of the specimens collected is marked (2).

Specimens of twenty New York species, new to the Herbarium, and not among my collections of the past season, have been contributed by, or been obtained in naming specimens for, correspondents. These added to the collected species make the whole number of additions one hundred and forty-seven species. A list of contributors and their contributions is marked (3).

Previously unreported species and descriptions of new species are given in a part of the report marked (4). New stations of rare plants, remarks and observations will be found in a part marked (5). A few discoveries of special interest are herewith narrated.

It is a well-known fact that various insects are subject to the attacks of parasitic fungi, which prove fatal to them. The common house-fly is destroyed by one, the silk-worm by another, and the pupæ of different moths by others.

Another noticeable instance of this kind was observed the past season. It was found that the "Seventeen-year Locust," *Cicada septendecim*, which made its appearance in the Hudson River Valley early in the summer, was affected by a fungus. The first specimen of this kind that I saw was taken in New Jersey, and sent to me by Rev. R. B. Post. Examination revealed the fact that the Cicadas, or "Seventeen-year Locusts," in this vicinity, were also affected by it. The fungus develops itself in the abdomen of the insect, and consists almost wholly of a mass of pale-yellowish or clay-colored spores, which, to the naked eye, has the appearance of a lump of whitish clay. The insects attacked by it become sluggish and averse to flight, so that they can easily be taken by hand. After a time some of the posterior rings of the abdomen fall away, revealing the fungus within. Strange as it may seem, the insect may, and sometimes does live for a time even in this condition. Though it is not killed at once, it is manifestly incapacitated for propagation, and, therefore, the fungus may be said to prevent, to some extent, the injury that would otherwise be done to the trees by these insects in the deposition of their eggs. For the same reason, the insects of the next generation must be less numerous than they otherwise would be, so that the fungus may be regarded as a beneficial one. In Columbia county, the disease prevailed to a considerable extent. Along the line of the railroad between Catskill and Livingston stations many dead cicadas

were found, not a few of which were filled by the fungoid mass. As the insect makes its appearance only at intervals of seventeen years, and consequently will not be seen here again till 1894, it will scarcely be possible to make any further observations on it and its parasite for some time to come, yet it would be interesting to know how the fungus is propagated, or where its germs remain during the long interval between the appearance of two generations. Do the fungus germs enter the ground in the body of the larva, and slowly develop with its growth, becoming mature when it is mature, or do they remain quiescent on or near the surface of the ground, waiting to enter the body of the pupa as it emerges seventeen years hence? Or, again, is it possible that the fungus is developed annually in some closely related species as the "Harvest-fly," *Cicada canicularis*, and that it passes over from its usual habitat to the seventeen-year cicada whenever it has the opportunity? These questions are merely suggestive. They cannot yet be answered.*

While in the Adirondack region numerous clumps of alders were noticed that had their leaves nearly all skeletonized by the larvæ of some unknown insect. The larvæ were nearly black in color and scarcely half an inch long. They were seen in countless numbers feeding upon the leaves and threatening by their numbers, even if but half of them should come to maturity, in another year to completely defoliate the alders of that region. Upon looking under the affected bushes for the pupæ of the insect, in order, if possible, to have the means of ascertaining the species, what was my astonishment to find the ground thickly flecked with little white floccose masses of mold, and that each one of these tufts of mold was the downy fungoid shroud of a dead larva from the alders. Not a single living pupa could be found, but there were hundreds of dead and moldy larvæ killed without doubt by the fungus, which is nature's antidote to an over-production of this insect, and nature's agency for protecting the alders from utter destruction.

While on the way from Summit to Jefferson in Schoharie county, an apple tree was observed on which much of the fruit was discolored, and appeared as if beginning to decay. Some of the passengers in the stage remarked that they "never before knew of apples rotting on the tree." Some of the fruit was procured, and found to be affected by a fungus known to botanists by the name *Sphæropsis Malorum*, or apple Sphæropsis. It has been described as attacking "apples lying on the ground" in winter. Here was an instance in which the apples were attacked while yet on the tree, and that, too, as early as September. The apples attacked by the fungus are rendered worthless, and experiments recently made indicate that the disease is contagious, and may be communicated from one apple to another. For example, a perfectly sound apple was placed in a drawer with one that was affected by the fungus. In a few days the sound apple began to show signs of decay. Its whole surface had assumed a dull brown color as if beginning to rot. Two or three days later small pale spots made their appearance, and in the center of each there was a minute rupture of the epidermis. An examination of the substance of the apple in these pale spots revealed fungoid filaments that had permeated the cells of the apple. In two or three days more, numerous minute black pustules or papillæ had appeared. They were thickly scattered over nearly the whole surface of the apple. These constitute the Sphæropsis. When microscopically examined, each one of these black papillæ is found to contain several oblong pale fungus spores (seeds) supported on a short stem or foot-stalk, from which they soon separate. It would be well, therefore, whenever this fungus-rot makes its

* Since this was written, I have found in the Smithsonian Contributions, Vol. v, p. 53, a very good account of this fungus, by Dr. Leidy, of Philadelphia, but as no name was given to it, a name and description will be published.

appearance, to remove the affected apples at once from the presence of the others, whether they are on the tree or not. It is not enough to throw them on the ground by themselves, for this would not prevent the fungus from maturing and scattering its seeds. They should be buried in the ground, or put in some place where it will not be possible for the fungus to perfect itself and mature its seed. In this way the multiplication of the spores and the spread of the disease may be prevented.

The importance of the balsam fir, *Abies balsamea*, as an ornamental evergreen and as a source of balsam, renders a brief account of it and its enemies desirable.

It prefers wet or marshy soil, in cold, hilly, or mountainous regions, yet it is quite at home on comparatively dry upland, and will thrive in almost any soil. Its growth is rapid, but the tree seldom attains a very large size, the trunk rarely exceeding one foot in diameter at the base. Its usual diameter is six to eight inches, with a height of thirty to forty feet. It has a straight, gradually tapering trunk, giving off, at intervals of one or two feet, circles of branches, each one of which is a little shorter than the one next below it. This gives to the head or spray a very regular form, resembling in outline an elongated cone. The branches are given off at a wide angle with the trunk. They are generally a little ascending, but sometimes horizontal, or slightly deflexed. The branchlets are numerous, and given off with considerable regularity at each node, though scattering or adventitious branches and branchlets are of frequent occurrence, both on the trunk and branches. There are usually three regular branchlets at each node, two spreading laterally (one from each side of the branch), and one extending downwards and outwards beneath the branch. The leaves have been described in some botanical works as two-ranked. They are, however, scattered on all sides of the leading shoots and branchlets, and are more or less spirally arranged in their insertion; but those on the lower side of the branchlets are so curved and directed upwards and outwards that they appear, as a whole, to be somewhat two-ranked. They are flattened like the leaves of the hemlock, but are usually longer than those of either the hemlock or spruce. The lower surface is marked by a prominent midrib, and has a silvery or glaucous lustre, which, combined with the deep green of the upper surface, gives to the foliage a richness and beauty unequaled by that of any other of our evergreens. They remain upon the tree four or five years, so that all the shorter branches are clad with rich, dense foliage, throughout their whole extent. The cones or fruit of the balsam are produced on the upper and, consequently, on the shorter and younger branches. I have never seen them on branches below the middle of the tree. They stand erect on the branches, and in this respect differ essentially from the pendulous cones of the spruce and hemlock. On the very short branches, near the top of the tree, they are often so close together that they appear crowded or clustered. Before maturity, they are more or less tinged with bluish, or violet and purplish hues, but their beauty is generally impaired by copious exudations of resin. When quite young they are bristly with the long, slender points of the bracts, but these are at length nearly concealed by the overlapping scales. The cones have been described as three to four inches long, but I have never seen them so long. Their usual length with us is one and a half to two and a half inches. Sometimes, on the mountains, small trees four to six feet high bear a few cones. This tree, like the spruce, in some situations varies considerably from the typical form. In the Catskill Mountains I have seen it dwarfed to a diffusely spreading bush, similar to the ground hemlock. Near the summit of the high peaks of the Adirondacks it loses its beauty and thrift, and forms dense thickets in which the trunks are but

a few feet high, rapidly tapering, and coated with lichens; the branches are long, straggling, crooked, and interlaced, the whole forming a hedge-like mass through which anything larger than a rabbit would find great difficulty in passing. Starved by the lack of soil; stunted in its growth by the short, cold seasons; pressed down by the weight of accumulating snow; and bruised and cut back by masses of ice and frozen snow hurled against it by fierce blasts of wind, it can no longer attain its usual size and its natural symmetry of form. These mountain thickets of balsam are of interest to the botanist, because they show the hardy character of the tree, and its ability to live where few other trees can live; but they are the constant dread of tourists who visit the unfrequented peaks of the Adirondacks, for they are passed only with the utmost difficulty and labor.

The wood of the balsam is of little value for lumber owing to the small size of the tree. It contains resin and burns freely, but with a crackling noise. The smoke is very penetrating and irritating to the eyes. Near the summits of the mountains, however, it is almost the only available wood for camps and camp-fires. The bark of this tree furnishes the well-known "Canada balsam," a clear viscid resin of considerable repute in medicine and much used in mounting objects for the microscope. The resin is obtained from small vesicles or "blisters" in the bark. It is generally more abundant in the thrifty smooth-barked trees of low damp lands than in the stunted growths of the mountains. Because of the value of this tree as a producer of balsam, and because of its beauty and fitness to adorn parks and pleasure grounds, it ought to be cherished and preserved. But like its companion, the spruce, it has its insect and fungoid foes. While at Summit, in Schoharie county, in September, I noticed in a small grove of balsams that a dozen or more of the trees had recently been killed or were then dying. The leaves had nearly all changed their color, but for the most part yet remained on the trees. An investigation showed pretty conclusively that an insect was the cause of the death of the trees. A minute bark-mining beetle, both in its mature and in its larval state, was found between the bark and the wood. The beetle perforates the bark, excavates its furrow along the inner surface in a horizontal direction, and deposits its eggs along the sides of the furrow which is less than one-sixteenth of an inch in diameter. As soon as the eggs are hatched, the larvæ begin to mine furrows of their own at right angles to the original gallery, one part eating their way upward and another downward between the bark and the wood. These larval galleries are nearly parallel to each other, and are at their beginning so minute that they are scarcely perceptible to the naked eye; but as the larva advances in its course, it increases in size and the diameter of its furrow increases in like manner. The larvæ were found (in some instances transformed to the mature beetle) each in the larger end of its own furrow. It will be observed from the direction of the original furrow, how powerful an agent for mischief this minute beetle is. Its work is carried on in the most vital part of the tree. Three or four beetles attacking the trunk at or about the same height, and on different sides of the tree, would completely and effectually girdle it and destroy its life. Even a single beetle, by extending its furrow entirely around the trunk, would accomplish the same result, but no furrows were found thus extended. The length of the original furrows appeared to be less than four inches. The beetle itself is scarcely more than one line long, and belongs to the genus *Tomicus*. The species is probably undescribed. In the case of the spruce-destroying beetle more workers are necessary to kill the tree because the main furrows are excavated longitudinally or parallel to the axis of the trunk, while in the case of the balsam-destroying beetle the original furrow is excavated at right angles to this axis, and therefore cuts off or destroys the vital action over a much broader space.

The destruction of the balsams was not limited to the single grove in which it was first observed. In several places along the road between Summit and Jefferson, dead and dying balsams were noticed; but the affected trees were not very numerous, and it would not be a difficult matter, with prompt and united action, to arrest the progress of the mischief. If each man, on whose land the balsams grow, would, as soon as signs of the presence of the trouble are manifest, cut the affected trees, strip off the bark and burn it, he would, by so doing, destroy the colonies of larvæ, and prevent the further spread of the mischief. It is not at all probable that trees once attacked and showing signs of death can be saved, and it would be far better to cut them immediately than to allow them to remain as nurseries for these tiny marauders.

Four species of fungi are now known that attack the leaves of our balsams. None of these, so far as I am aware, actually kill the tree, but all of them necessarily detract somewhat from the vigor and the beauty of it. One of them, a kind of cluster-cup fungus, known as *Peridermium elatinum*, or fir-tree *Peridermium*, consists of minute whitish cups, filled with a deep yellow or orange-colored powder, which is the spores or seeds of the fungus. These cups burst forth from and occupy the whole of the lower surface of the leaf. This fungus is very thorough in its work, for every leaf on the affected branches is made to support its share of the cups. It detracts so much from the vigor of the leaves that they have a sickly, yellowish-green color, and do not attain more than half the size of healthy leaves. Still they are not killed at once. They remain on the tree during the summer, but fall sometime before the next succeeding crop of leaves is developed, for on the affected branches, only the leaves of a single season can be found, and these are always on the terminal shoots, and always affected by the fungus. From this, it appears that the disease is in the branch, and bursts out and makes itself visible in each successive crop of leaves. The branches affected by it are deformed, irregular, contorted and massed together, forming that peculiar dense and intricate growth, commonly known as "crow's nest." It is not often that more than one or two branches of a tree, with the branchlets, are attacked, consequently it is an easy matter to cut off the affected branches and relieve the tree from this incumbrance.

Another similar fungus, the *Peridermium balsameum*, attacks the leaves in a sort of hap-hazard manner, affecting some here and some there. This fungus, like the other, consists of minute cups that burst forth from the lower surface of the leaves, but the cups are generally longer and cylindrical, and filled with a pale or whitish powder. The affected leaves in this case attain their normal size, but they lose their green color and become pale yellowish or almost white, and being scattered everywhere among the green leaves, they give a singular variegated appearance to the foliage. I have never met with this fungus except on small balsams in the Adirondack wilderness, and near Summit, and it is not very likely to prove detrimental to transplanted or cultivated trees.

In a grove of young balsams, near Summit, patches or groups of dead leaves were observed on many of the branches of some of the trees. An examination showed that these leaves were affected by two fungi, which, in some instances, were associated together in the same group of leaves, and even on the same leaf; in other cases each fungus occupied exclusively its own group of leaves. One of them is known to botanists by the name *Hypoderma nervisequum*, or nerve-following *Hypoderma*. It forms a black line along the midrib of the leaf, being more prominent and uniform on the lower surface. This thick black line or ridge at length ruptures along the center. It contains within a multitude of microscopic, nearly cylindrical, membranous sacks, each of which contains eight long narrow spores.

The other fungus, which does not appear to have been previously known, and to which I have given the name *Dermatea phyllophila*, or leaf-loving *Dermatea*, consists of minute shallow cups, which break forth from the lower surface of the leaf, rupturing the epidermis, and sometimes throwing off a little scale of it. These cups, when moist, are of a dingy-white color, but when dry are contracted, irregular, and of a darker hue. Like the preceding species, they contain many minute sacks and spores. Though these fungi kill the leaves that they attack, there is no evidence that they kill the trees, yet, if the attack should extend to all or nearly all the leaves on a tree at any one time, it is evident the life of the tree would be in danger.

(1.)

PLANTS MOUNTED.

Not new to the Herbarium.

Hamamelis Virginica L.
Claytonia Caroliniana Mx.
Rosa micrantha Sm.
Daucus Carota L.
Aster corymbosus Ait.
A. miser L.
A. simplex Willd.
Solidago squarrosa Muhl.
S. Canadensis L.
S. gigantea Ait.
Helianthus tuberosus L.
Ilex verticillata L.
Lycopus Virginicus L.
Potamogeton natans L.

Habenaria psychodes Gr.
Eleocharis Robbinsii Oakes.
Scirpus subterminalis Torr.
Eriophorum gracile Koch.
Carex Buxbaumii Wahl.
C. utriculata Boott.
Leersia oryzoides Sw.
L. Virginica Willd.
Festuca elatior L.
Panicum glabrum Gaud.
Andropogon scoparius Mx.
Adiantum pedatum L.
Aspidium acrostichoides Sw.

New to the Herbarium.

Trifolium hybridum L.
Lonicera Tartarica L.
Artemisia Absinthium L.
Hieracium aurantiacum L.
Datura Tatula L.
Smilax hispida Muhl.
Agaricus striatifolius Pk.
A. apertus Pk.
A. flavidellus Pk.
A. peltigerinus Pk.
A. conigenoides Ellis.
A. delicatellus Pk.
A. odorifer Pk.
A. subareolatus Pk.
A. striatulus Fr.
A. longistriatus Pk.
A. indecens Pk.
A. contrarius Pk.
A. lacrymabundus Fr.

Agaricus Candolleanus Fr.
A. limophilus Pk.
A. umbonatescens Pk.
A. arenulinus Pk.
A. polytrichophilus Pk.
A. graciloides Pk.
Cortinarius ophiopus Pk.
C. craticius Fr.
C. regularis Pk.
Marasmius præacutus Ellis.
Panus torulosus Fr.
Boletus viscosus Frost.
Polyporus dualis Pk.
P. nidulans Fr.
P. fragrans Pk.
P. albellus Pk.
P. connatus Weinm.
P. balsameus Pk.
P. obducens Pers.

- Polyporus callosus Fr.*
P. farinellus Fr.
Hydnum Weinmanni Fr.
Irpeex sinuosus Fr.
I. fuscoviolaceus Fr.
I. obliquus Fr.
Radulum orbiculare Fr.
Phlebia merismoides Fr.
Thelephora speciosa Fr.
Hymenochaete spreta Pk.
H. agglutinans Ellis.
Corticium quercinum Pers.
C. lacteum Fr.
C. Sambuci Fr.
C. cærulenum Fr.
C. Martianum B. & C.
C. suffocatum Pk.
Cyphella griseopallida Wein.
Clavaria typhuloides Pk.
C. amethystina Bull.
Pistillaria coccinea Cd.
Tremella intumescens Sow.
Næmatelia encephala Fr.
Dacrymyces minor Pk.
Amaurochaete atra A. & S.
Physarum luteolum Pk.
P. albicans Pk.
Diachæa splendens Pk.
Trichia fallax Pers.
Perichæna irregularis B. & C.
Clathroptychium rugulosum Wallr.
Nidularia pulvinata Schw.
Leptostroma lineare Pk.
Phoma strobilina P. & C.
P. stercoraria P. & C.
Sphæronema Robiniæ B. & C.
S. aurantiacum Pk.
Sphæropsis Pennsylvanica B. & C.
S. minima B. & C.
S. Syringæ P. & C.
Diplodia thujina P. & C.
Excipula lanuginosa Pk.
Discella Canadensis Pk.
D. arida Pk.
Melanconium intermedium Pk.
Torula curvata Pk.
Septonema dichænoides P. & C.
Puccinia orbicula P. & C.
P. Hydrophylli P. & C.
Uredo Cassandræ P. & C.
Melampsora Epilobii Fckl.
Æcidium Saniculæ Carm.
Helminthosporium Absinthii Pk.
Macrosporium sarcinula Berk.
Cladosporium nodulosum Cd.
C. depressum B. & Br.
Ramularia brunnea Pk.
Cereospora Symplocarpi Pk.
C. Chenopodii Fckl.
Verticillium pulvercum P. & C.
Peronospora infestans De By.
Polyactis cana Berk.
Trichoderma viride Pers.
Dactylium sublutescens Pk.
Oidium fasciculatum Berk.
O. albipes Pk.
Capillaria Sphæriæ-typhinæ Cd.
Menispora ciliata Cd.
Zygodesmus pannosus B. & C.
Z. rubiginosus Pk.
Fusisporium rimosum Pk.
Erysiphe Liriodendri Schw.
Morchella bispora Sor.
M. semilibera DC.
M. deliciosa Fr.
Verpa digitaliformis Pers.
Peziza sulcata Pers.
P. Warnei Pk.
P. bicolor Bull.
P. myricacea Pk.
P. sulphurella Pk.
P. capitata Pk.
P. distincta Pk.
P. maculincola Schw.
P. chameleontina Pk.
P. deligata Pk.
P. Polygoni Rehm.
P. macrospora Fckl.
Helotium caricinellum Pk.
H. bryogenum Pk.
Dermatea carpinea Fr.
D. inclusa Pk.
Patellaria leptosperma Pk.
P. lignyota Fr.
Tympanis turbinata Schw.
Ascobolus viridis Curr.
A. crenulatus Karst.
Stietis cylindricarpa Pk.
Hysterium australe Duby.
H. Thuiarum C. & P.
H. Desmazierii Duby.
Glonium simulans Ger.
Hypomyces ochraceus Tul.
Hypoxylon suborbiculare Pk.
Dothidea Rinnicola Schw.
D. episphæria Pk.
D. Caricis Fr.
D. Osmundæ P. & C.

Valsa innumerabilis *Pk.*
Cucurbitaria Berberidis *Gr.*
Lophiostoma oblecta *Pk.*
Sphaeria Clintonii *Pk.*
S. xestothele *B. & C.*
S. exigua *C. & P.*
S. Clasterium *B. & C.*
S. sphaerelloides *Pk.*

Sphaeria exercitalis *Pk.*
S. virens *Pk.*
S. scapophila *Pk.*
S. onosmodina *P. & C.*
S. herbarum *Pers.*
Sphaerella Vaccinii *Ck.*
S. Impatiensis *P. & C.*
Pyrenophora phaeocomes *Fr.*

(2.)

PLANTS COLLECTED.

Solidago humilis *Pursh.*
Potamogeton lonchitis *Tuckerm.*
Salix purpurea *L.*
Graphis eulectra *Tuckerm.*
Calicium curtum *T. & B.*
C. brunneolum *Ach.*
Sirosiphon Crameri *Brugg.*
Agaricus cristatellus *Pk.*
A. fumescens *Pk.*
A. pinophilus *Pk.*
A. rubromarginatus *Fr.*
A. radicatellus *Pk.*
A. chrysophyllus *Fr.*
A. abscondens *Pk.*
A. septicus *Fr.*
A. albogriseus *Pk.*
A. micropus *Pk.*
A. undulatellus *Pk.*
A. rhodocalyx *Lasch.*
A. squarrosoides *Pk.*
A. limonellus *Pk.*
A. vermifluus *Pk.*
A. paludinellus *Pk.*
A. lenticeps *Pk.*
A. hymenocephalus *Pk.*
A. camptopus *Pk.*
Coprinus macrosporus *Pk.*
C. rotundosporus *Pk.*
Cortinarius Copakensis *Pk.*
C. lapidophilus *Pk.*
Marasmius calopus *Fr.*
Boletus Satanus *Leur.*
Polyporus pallidus *Schulz.*
P. Weinmanni *Fr.*
P. planus *Pk.*
P. subiculosus *Pk.*
P. semitinctus *Pk.*
Trametes suaveolens *L.*

Solenia villosa *Fr.*
Hydnum sulphurellum *Pk.*
Mucronella calva *A. & S.*
M. aggregata *Fr.*
Craterellus dubius *Pk.*
Stereum sanguinolentum *A. & S.*
Cyphella sulphurea *Batsch.*
Clavaria fumigata *Pk.*
C. corynoides *Pk.*
Tremella lutescens *Pers.*
Guepinia Peziza *Tul.*
Hymenula olivacea *Pk.*
Lycoperdon glabellum *Pk.*
L. calyptriforme *Berk.*
Physarum psittacinum *Dittm.*
P. atrorubrum *Pk.*
P. ornatum *Pk.*
P. inaequalis *Pk.*
Badhamia affinis *R.*
Didymium eximium *Pk.*
D. angulatum *Pk.*
Chondrioderma difforme *Pers.*
Diachæa subsessilis *Pk.*
Comatricha æqualis *Pk.*
C. Friesiana *DeBy.*
C. pulchella *Bab.*
Lamproderma violaceum *Fr.*
Trichia scabra *R.*
T. inconspicua *R.*
Arcyria pomiformis *Roth.*
Lycogala flavofuscum *Ehr.*
Sacidium Pini *Fr.*
Septoria Waldsteiniae *P. & C.*
S. Verbascicola *B. & C.*
Phyllosticta Lonicerae *Desm.*
Sporidesmium sicynum *Thum.*
Massospora cicadina *Pk.*
Ustilago Salvei *B. & Br.*

<i>Phragmidium bulbosum Fr.</i>	<i>Cenangium pezizoides Pk.</i>
<i>Isaria tenuipes Pk.</i>	<i>Tympanis acerina Pk.</i>
<i>Stilbum rigidum Pers.</i>	<i>Patellaria olivacea Batsch.</i>
<i>S. flavipes Pk.</i>	<i>Phacidium brunneolum Pk.</i>
<i>Sporocybe abietina Pk.</i>	<i>Triblidium morbidum Pk.</i>
<i>Cladosporium graminum Lk.</i>	<i>Hypoderma nervisequum DC.</i>
<i>Helminthosporium interseminatum</i>	<i>Rhytisma maximum Fr.</i>
<i>H. Hydropiperis Thum.</i>	<i>Hypoecrea viridis Tode.</i>
<i>Botryosporium pulchrum Berk.</i>	<i>Hypoxylon xanthoereas B. & C.</i>
<i>Aspergillus flavus Lk.</i>	<i>Dothidea Epilobii Fr.</i>
<i>Fusidium canum Pass.</i>	<i>Valsa Cratægi Curr.</i>
<i>Peronospora simplex Pk.</i>	<i>V. translucens De Not.</i>
<i>Mucor caninus Pers.</i>	<i>V. Xanthoxyli Pk.</i>
<i>M. ramosus Bull.</i>	<i>Lophiostoma scelestum C. & E.</i>
<i>Peziza succosa Berk.</i>	<i>L. prominens Pk.</i>
<i>P. vulcanalis Pk.</i>	<i>Massaria gigaspora Desm.</i>
<i>P. sulphurea Pers.</i>	<i>Sphaeria pulchriseta Pk.</i>
<i>P. viridicoma Pk.</i>	<i>S. sorghophila Pk.</i>
<i>P. brunneola Desm.</i>	<i>S. Typhæ Schw.</i>
<i>P. Osmundæ C. & E.</i>	<i>S. curvicolla Pk.</i>
<i>Helotium albopunctum Pk.</i>	<i>S. Gnomon Tode.</i>
<i>Dermatea carnea C. & E.</i>	<i>S. phellogena B. & C.</i>
<i>D. phyllophila Pk.</i>	<i>S. Crepini West.</i>
<i>D. Xanthoxyli Pk.</i>	<i>S. Marciensis Pk.</i>
<i>Hæmatomyces orbicularis Pk.</i>	<i>Venturia Dickiei De Not.</i>
<i>Cenangium Cassandræ Pk.</i>	

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Miss S. P. MONKS, Cold Spring, N. Y.

<i>Viola pedunculata T. & G.</i>	<i>Gilia tricolor Benth.</i>
<i>V. Nuttallii Pursh.</i>	<i>G. ciliata Benth.</i>
<i>Claytonia perfoliata Don.</i>	<i>G. Californica Benth.</i>
<i>Ribes sanguineum Pursh.</i>	<i>G. androsæcea Steud.</i>
<i>Hosackia strigosa Nutt.</i>	<i>G. dianthoides Endl.</i>
<i>Astragalus trichocarpus Gr.</i>	<i>Plantago Patagonica Jacq.</i>
<i>A. hypoglottis L.</i>	<i>Pellaea densa Hook.</i>
<i>Oenothera parvula Nutt.</i>	<i>Cystopteris fragilis R. Br.</i>

Mrs. S. M. RUST, Syracuse, N. Y.

<i>Aspidium spin. v. dumetorum</i>	<i>Botrychium ternatum Sw.</i>
<i>Onoclea sens. v. obtusilobata</i>	<i>B. gracile Pursh.</i>
<i>Botrychium Lunaria Sw.</i>	

I. C. MARTINDALE, Camden, N. J.

<i>Alyssum calycinum L.</i>	<i>Lechea major Mx.</i>
<i>Senebiera didyma Pers.</i>	<i>Hypericum prolificum L.</i>
<i>Viola tricolor v. arvensis.</i>	<i>Drosera long. v. densiflorum.</i>

Drosera filiformis Raf.
D. rotundifolia L.
Brassica tenuifolia Boisd.
Lychnis diurna Sibth.
Melilotus parviflora Desf.
Sesuvium pentandrum Ell.
Heliotropium Europæum L.
Potentilla reptans L.
Silene inflata Sm.
Jussiaea repens L.
Senecio Jacobæa L.

Cacalia reniformis Muhl.
Linaria elatine Mill.
L. Spuria Mill.
Leonurus glaucescens Bange.
Helmintha echioides Gært.
Heterotheca scabra DC.
Vigna glabra Savi.
Richardsonia scabra St. Hil.
Euphorbia hiberna L.
Gentiana angustifolia Mx.
Tribulus terrestris L.

N. L. BRITTON, New Dorp, N. Y.

Pinus mitis Mx.

Pinus inops Ait.

E. S. MILLER, Wading River, N. Y.

Barbarea præcox R. Br.
Sagina apetala L.
Spergularia rub. v. campestris.
Lathyrus palustris L.
L. myrtifolius Muhl.
Lespedeza vio. v. sessiliflora.
Vicia Caroliniana Walt.
Eupatorium teucrifolium Willd.
Aster undulatus L.
A. lævis L.
Oenothera pumila L.
O. chrysantha Mx.
Galium circæans Mx.
Erigenia bulbosa Nutt.
Vaccinium corymbosum L.
Pyrola rotundifolia L.
Teucrium Canadense L.
Myosotis verna Nutt.
Plantago Virginea L.
Utricularia gibba L.
U. subulata L.
Potamogeton Oakesiana Robbins.
Lemna polyrrhiza L.

Lemna perpusilla Torr.
Sagittaria variabilis Engelm.
Muscari racemosum L.
Eriophorum Virginicum L.
Fuirena squarrosa Mx.
Eleocharis obtusa Schultes.
E. melanoearpa Torr.
E. tricostata Torr.
Carex scoparia Schk.
C. polytrichoides Muhl.
C. stipata Muhl.
C. fœnea Willd.
C. stellulata L.
C. Pennsylvanica Lam.
C. granularis Muhl.
C. lanuginosa Mx.
C. hystericina Willd.
Festuca ov. v. duriuscula.
Glyceria nervata Trin.
Eragrostis reptans Mx.
Panicum verrucosum Muhl.
P. depauperatum Muhl.
Millieria herbatica Pk.

E. A. RAU, Bethlehem, Pa.

Discelium nudum Brid.
Æcidium hemisphaerium Pk.
Æ. porosum Pk.
Æ. Brandagei Pk.
Æ. abundans Pk.

Æcidium Bigeloviae Pk.
Uromyces hyalinus Pk.
Lecythea speciosa Pk.
Sphæropsis Rauli Pk.
Chaetomium elatum Kze.

W. R. GERARD, New York, N. Y.

Glonium parvulum Ger.
Ailographum Pinorum Desm.

Hysterium hyalosporum Ger.
H. Cookeanum Ger.

Rev. H. WIBBE, Oswego, N. Y.

<i>Drosera longifolia</i> L.	<i>Erythraea Centaurium</i> Pers.
<i>Habenaria ciliaris</i> R. Br.	<i>Scirpus Eri.</i> v. <i>cyperinus</i> .
<i>H. leucophaea</i> Nutt.	<i>Rhynchospora macrostachya</i> Torr.
<i>Houstonia pur.</i> v. <i>ciliolata</i> .	<i>Botrychium simplex</i> Hitch.
<i>Trillium erythrocarpum</i> Mx.	

Prof. P. A. PUISSANT, Troy, N. Y.

Carex panicea L.

L. M. UNDERWOOD, Syracuse, N. Y.

<i>Scolopendrium vulgare</i> Sm.	<i>Aspidium marginale</i> Sw.
<i>Asplenium Rutamuraria</i> L.	<i>Cystopteris fragilis</i> Bernh.

H. WILLEY, New Bedford, Mass.

Arthonia polymorpha Ach.

Hon. G. W. CLINTON, Buffalo, N. Y.

<i>Triticum caninum</i> L.	<i>Puccinia spreta</i> Pk.
<i>Aspid. crist.</i> v. <i>Clintoniana</i> .	<i>Uromyces Trifolii</i> Fckl.
<i>Meliola Macowani</i> Thum.	<i>U. polymorphus</i> P. & C.
<i>Melanconium Americanum</i> P. & C.	<i>Uredo transversalis</i> Thum.
<i>Septoria Waldsteiniae</i> P. & C.	<i>Polyactis vulgaris</i> Lk.
<i>Vermicularia trichella</i> Grev.	<i>Peziza planodisca</i> P. & C.
<i>V. albomaculata</i> Schw.	<i>Sphaeria cladosporiosa</i> Schw.

C. C. FROST, Brattleboro, Vt.

<i>Cortinarius Spragueii</i> B. & C.	<i>Lycogala flavofusum</i> Ehr.
<i>Russula compacta</i> Frost.	<i>Sphaeropsis Sumachi</i> Schw.
<i>Boletus Satanus</i> Lenz.	<i>Patellaria nigrocinabarina</i> Schw.
<i>Polyporus tomentosus</i> Fr.	<i>Hypoxylon marginatum</i> Fr.
<i>Clavaria arbori-similis</i> Frost.	<i>Diatrypella Frostii</i> Pk.
<i>Michenera Artoceas</i> B. & C.	

J. B. ELLIS, Newfield, N. J.

<i>Lenzites vialis</i> Pk.	<i>Clasterisporium caricinum</i> Schw.
<i>Sphaeropsis Ribicola</i> C. & E.	<i>Cercospora concentrica</i> C. & E.
<i>S. Alni</i> C. & E.	<i>C. grisea</i> C. & E.
<i>Septoria stictica</i> Ellis.	<i>Peziza coccinella</i> Somm.
<i>Septosporium maculatum</i> C. & E.	<i>P. fuscidula</i> Ck.
<i>Pestalozzia stellata</i> B. & C.	<i>P. ilicifolia</i> C. & E.
<i>Vermicularia compacta</i> C. & E.	<i>P. bullata</i> Ellis.
<i>Sporidesmium hysteroideum</i> C. & E.	<i>Hysterium subrugosum</i> C. & E.
<i>S. polymorphum</i> Cd.	<i>Colpoma Andromedae</i> Duby.
<i>S. aurantiacum</i> B. & C.	<i>Stictis quercifolia</i> C. & E.
<i>Periconia Azaleae</i> Pk.	<i>S. fimbriata</i> Schw.
<i>Epicoecum scabrum</i> Cd.	<i>Nectria microspora</i> C. & E.
<i>Fusisporium episphaericum</i> C. & E.	<i>Dothidea tetraspora</i> B. & Br.

Valsa rugiella <i>C. & E.</i>	Sphæria microtheca <i>C. & E.</i>
V. obscura <i>Pk.</i>	S. orthoceras <i>Fr.</i>
Massaria epileuca <i>B. & C.</i>	S. tumulata <i>C. & E.</i>
Lophiostoma scelestum <i>C. & E.</i>	S. soluta <i>C. & E.</i>
Sphæria salviæcola <i>C. & E.</i>	S. dissiliens <i>C. & E.</i>
S. luteobasis <i>Ellis.</i>	S. surrecta <i>Ck.</i>
S. vexata <i>C. & E.</i>	S. sepelibilis <i>B. & C.</i>
S. melanotes <i>B. & Br.</i>	S. aculeata <i>Schw.</i>
S. minima <i>Awd.</i>	

H. A. WARNE, Oneida, N. Y.

Polyporus induratus <i>Pk.</i>	Peziza Umbrorum <i>Fekl.</i>
Lycoperdon giganteum <i>Batsch.</i>	P. gallinacea <i>Pk.</i>
Diatrype asterostoma <i>B. & C.</i>	Sphæria fimiseda <i>C. & N.</i>

B. D. GILBERT, Utica, N. Y.

Aspidium spinulosum <i>Desv.</i>	Asplenium resectum <i>Sm.</i>
A. Boottii <i>Tuckerm.</i>	Cystopteris frag. v. dentata.

M. W. VANDENBURG, Fort Edward, N. Y.

Rhus aromatica <i>Ait.</i>	Utricularia subulata <i>L.</i>
R. typhina <i>L.</i>	Pogonia affinis <i>Aust.</i>
Solidago latifolia <i>L.</i>	

G. S. WATKINS, Wilmurt, N. Y.

Polyporus Beatiei <i>Banning.</i>	
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G. T. FISH, Rochester, N. Y.

Impatiens fulva <i>Nutt.</i>	Polyporus Beatiei <i>Banning.</i>
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C. DEVOL, M. D., Albany, N. Y.

Section of stem of Kalmia latifolia <i>L.</i>	
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P. C. BROWER, Albany, N. Y.

California hickory nuts.	
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(4)

PLANTS NOT BEFORE REPORTED.

SOLIDAGO HUMILIS *Pursh.*

Gravelly bank at the outlet of Lower Ausable Pond, Adirondack Mountains. Aug.

The smaller heads, shorter flowers, whiter pappus and sharper serratures of the leaves, induce me to report this as a distinct species.

UTRICULARIA SUBULATA *L.*

Fort Edward. *M. W. Vandenburg.* Wading River, Long Island. *E. S. Miller.*

SALIX PURPUREA *L.*

Low grounds. Albany and Bethlehem. An introduced willow, which has run wild in some places.

POTAMOGETON LONCHITIS *Tuckerm.*

Ticonderoga. Aug.

LISTERA AUSTRALIS *Lindl.*

Lily Marsh, Oswego. *Rev. H. Wibbe.* This is an interesting addition to our flora.

POGONIA AFFINIS *Aust.*

Fort Edward. *Vandenburg.*

MUSCARI RACEMOSUM *L.*

Wading River. *Miller.* A stray from cultivation.

ELEOCHARIS TRICOSTATA *Torr.*

Wading River. *Miller.* This is probably the northern limit of this plant.

WOODSIA HYPERBOREA *Br.*

Crevices of rocks. Adirondack Mountains. Small forms of this fern closely resemble *W. glabella*, and it is, perhaps, questionable whether they should be regarded as two distinct species. In our specimens the chaffy scales of *W. hyperborea* are present, but not in abundance. The specimens were formerly referred to *W. glabella*.

ARTHONIA POLYMORPHA *Ach.*

Bark of trees. Geneseo. *H. Willey.*

GRAPHIS EULECTRA *Tuckerm.*

Bark of arbor-vitæ. Newcomb, Essex county. Aug.

CALICIUM BRUNNEOLUM *Ach.*

Decaying balsam trunks. Mount Marey. Aug.

CALICIUM CURTUM *Turn. & Bor.*

Decaying prostrate trunks of hemlock trees. Catskill Mountains. Sept.

CHLOROSTYLUM CATARACTARUM *Kutz.*

Granite pebbles in running streams. Caledonia. *G. W. Clinton.*

SIROSIPHON CRAMERI *Brugg.*

Wet surface of rocks. Mt. Marey. Aug.

AGARICUS (LEPIOTA) CRISTATELLUS *Pk.*

Pileus convex, subumbonate, minutely mealy, especially on the margin, white, the disk slightly tinged with pink; lamellæ close, rounded behind, free, white; stem slender, whitish, hollow; spores subelliptical, .0002 * long. Plant about 1 high, pileus 2 -4" broad.

Mossy places in woods. Copake, Columbia County. Oct.

The relationship of this very small species appears to be with *A. cristatus*.

The margin of the pileus is sometimes appendiculate with the minute fragments of the veil. The annulus is obsolete.

* One accent signifies inch or inches, two accents signify line or lines.

AGARICUS (TRICHOLOMA) FUMESCENS *Pk.*

Pileus convex or expanded, dry, clothed with a very minute appressed tomentum, whitish; lamellæ narrow, crowded, rounded behind, whitish or pale cream color, changing to a smoky blue or blackish color when bruised; stem short cylindrical, whitish; spores oblong-elliptical, .0002-.00025' long.

Plant 1-2' high, pileus 1' broad, stem 2-3' thick.

Ground in woods. Copake. Oct.

The species is remarkable for the smoky or blackish hue assumed by the lamellæ when bruised, and also in drying.

AGARICUS (CLITOCYBE) PINOPHILUS *Pk.*

Pileus thin, convex, umbilicate or centrally depressed, glabrous, moist, pale tan-color, paler or alutaceous when dry; lamellæ moderately close, subarcuate, adnate or slightly decurrent, whitish; stem equal, stuffed or hollow; glabrous or subpruinose, colored like the pileus; spores nearly elliptical, .0002-.00025' long; odor and taste resembling that of fresh meal.

Plant 1-2' high, pileus about 1' broad, stem 1"-2" thick.

Ground under pine trees. Albany and Ticonderoga. July and August.

AGARICUS RUBROMARGINATUS *Fr.*

Ground under spruce trees. Adirondack Mountains. August.

Our specimens when fresh had a slight alkaline odor; otherwise they agree well with the description of the species.

AGARICUS (MYCENA) RADICATELLUS *Pk.*

Pileus thin, campanulate, glabrous, obtuse or subumbonate, whitish, when dry striate on the margin; lamellæ ascending, narrow, close, white; stem firm, glabrous, slender, whitish, deeply rooting; spores subglobose, rough, .0003'-.00035' long.

Plant 1.5-2' high, pileus 4-6' broad.

Mossy ground in woods. Griffins. Delaware County. Sept.

This species is easily known by the long radicular portion of the stem, which penetrates the earth after the manner of *A. radicatus*.

AGARICUS CHRYSOPHYLLUS *Fr.*

Decaying wood. Adirondack Mountains, Summit and Sandlake. Aug. and Sept.

AGARICUS (PLEUROTUS) ABSCONDENS *Pk.*

Pure white; pileus compact, convex or slightly depressed on the disk, glabrous, dry; lamellæ thin, crowded, emarginate, with a decurrent tooth; stem eccentric, curved, stuffed, slightly mealy at the top; spores minute, elliptical, .0002' long, usually with a shining nucleus; odor distinct, farinaceous.

Stem about 2' long, pileus 2'-3' broad.

In hollow stumps. Griffins. Sept.

AGARICUS SEPTICUS *Fr.*

Decaying wood. Adirondack Mountains. Aug.

AGARICUS (CLITOPILUS) ALBOGRISEUS *Pk.*

Pileus firm, convex or slightly depressed in the center, smooth, pale-gray; lamellæ moderately close, adnate or slightly decurrent, grayish, then flesh-colored; stem solid, colored like the pileus; spores angular, irregular, .0004-.0005 long, .0003 broad; odor farinaceous.

Plant 2-3' high, pileus 6'-12" broad, stem 1"-2" thick.

Ground in woods. Adirondack Mountains. Aug.

AGARICUS (CLITOPILUS) MICROPUS *Pk.*

Pileus thin, fragile, convex or centrally depressed, umbilicate, silky, gray, usually with one or two narrow zones on the margin; lamellæ narrow, close, adnate or slightly decurrent, gray; stem short, solid, slightly thickened at the top, gray, pruinose, with white mycelium at the base; spores angular, irregular, .0004 long, .00025 broad; odor farinaceous.

Plant 1 high, pileus 6'-12" broad.

Ground under trees. Ticonderoga. Aug.

AGARICUS (LEPTONIA) UNDULATELLUS *Pk.*

Pileus membranaceous, convex, minutely scurfy, squamulose on the disk, hygrophanous, grayish-brown and striatulate when moist, wavy on the margin; lamellæ rounded behind, nearly free, subdistant, whitish, then tinged with flesh-color; stem slender, glabrous, colored like the pileus, usually curved; spores irregular, .0004 long, .0003 broad.

Plant about 1 high, pileus 6'-8" broad.

Decaying prostrate trunks of trees. Pine Hill. Sept.

When dry, the pileus is somewhat shining, and the disk a little darker.

AGARICUS RHODOCALYX *Lasch.*

Ground in woods. Adirondack Mountains. Aug.

AGARICUS (PHOLIOTA) SQUARROSIDES *Pk.*

Pileus firm, convex, viscid when moist, at first densely covered by erect papillose or subspinose tawny scales, which soon separate from each other, revealing the whitish color and viscid character of the pileus; lamellæ close, emarginate, at first whitish, then pallid or dull cinnamon color; stem equal, firm, stuffed, rough with thick squarrose scales, white above the thick floccose annulus, pallid or tawny below; spores minute, elliptical, .0002' long, .00015' broad.

Densely caespitose, 3-6' high, pileus 2-4' broad, stem 3'-5" thick.

Dead trunks and old stumps of maple. Adirondack and Catskill Mountains. Autumn.

This is evidently closely related to *A. squarrosus*, with which it has, perhaps, been confused, but its different colors and viscid pileus appear to warrant its separation.

AGARICUS (PHOLIOTA) LIMONELLUS *Pk.*

Pileus thin, convex or expanded, subumbonate, viscid, rough with scattered erect reddish-brown scales, lemon-yellow; lamellæ narrow, close, rounded

behind, whitish; stem equal, solid, rough with revolute or recurved scales, pallid or yellowish, smooth above the lacerated annulus, dusted with yellow particles at the insertion of the lamellæ; spores elliptical, .0003-.00035' long, .0002-.00025' broad.

Plant caespitose, 2'-3' high, pileus 1'-2' broad, stem 2'-3" thick.

Prostrate beech trunks in woods. Griffins. Sept.

This is one of our most beautiful species. It is easily separated from its allies by its lively lemon-yellow color. It is allied to *A. flammans*.

AGARICUS (PHOLIOTA) VERMIFLUUS *Pk.*

Pileus convex or expanded, smooth, white, often tinged with yellow, sometimes areolate-rimose, especially on the disk, the margin decurved, and sometimes floccose-squamose from the remains of the veil; lamellæ close, white, then ferruginous-brown, usually minutely eroded on the edge; stem hollow, striated at the top where it is sometimes thickened, white; annulus lacerated or evanescent; spores ferruginous-brown, .00045'-.0005' long, .0003 broad.

Plant 2'-4' high, pileus 2'-4' broad, stem 3"-5" thick.

Fields among oat stubble. Ticonderoga. Aug.

This species is evidently closely related to *A. præcox*, but its larger size, larger spores, late appearance, etc., induce me to separate it. When moist, the pileus appears to be slightly viscid. It is so liable to the attacks of insect larvæ that it is difficult to dry a specimen before it is badly eaten.

AGARICUS (INOCYBE) PALUDINELLUS *Pk.*

Pileus thin, plane or slightly convex, umbonate, subfibrillose, whitish or pallid; lamellæ narrow, close, whitish then subferruginose; stem slender, equal, colored like the pileus, with an abundant white mycelium at the base; spores subelliptical, nodulose, .0003' long, .0002' broad.

Plant gregarious, 1'-2' high, pileus 5"-10" broad, stem nearly 1" thick.

In low grounds and wet places under bushes. Sandlake. Aug.

This species is easily recognized by its pale, umbonate pileus and nodulose spores.

AGARICUS (NAUCORIA) LENTICEPS *Pk.*

Pileus thin, convex or nearly plane, dingy-ochre or subolivaceous, the disk brown or blackish-brown; lamellæ plane, subdistant, adnate, with a decurrent tooth, whitish or pallid; stem slender, hollow, paler above and slightly squamulose; spores large, variable in size, .0005'-.00075' long, .0003-.0004' broad.

Plant 1'-1.5' high, pileus 6'-10' broad, stem scarcely 1" thick.

Sandy soil along railroads. Center. Oct.

AGARICUS (HYPHOLOMA) HYMENOCEPHALUS *Pk.*

Pileus thin, fragile, campanulate then expanded, sometimes umbonate, hygrophanous, brown and striatulate when moist, pallid or whitish and radiately rugulose when dry, subatromate, the whitish appendiculate veil soon evanescent; lamellæ narrow, close, dingy then brown; stem slender, brittle,

hollow, striate and slightly mealy at the top, white; spores brown, elliptical, .0003' long, .00016' broad.

Plant 3'-4' high, pileus 1'-2' broad, stem 1'-1.5'' thick.

Ground under alders. Adirondack Mountains. Aug.

It belongs to the section *Appendiculati*, and is remarkable for the fragile character of the pileus and stem.

AGARICUS (PSILOCYBE) CAMPTOPUS *Pk.*

Pileus thin, broadly convex, glabrous, hygrophanous, brown and striatulate when moist, whitish when dry; lamellæ narrow, close, whitish becoming brown; stem equal, smooth, generally curved, slightly pruinose or mealy at the top, with a white strigose mycelium at the base; spores elliptical, .00025' long, .00016' broad.

Plant about 1' high, pileus 4''-10'' broad.

Prostrate trunks of trees in woods. Catskill Mountains. Sept.

This plant bears some resemblance in color to *A. appendiculatus*, but I find no trace of a veil. The stem is solid, and the pileus is even when dry.

COPRINUS MACROSPORUS *Pk.*

Pileus ovate, then expanded, rimose-striate, obscurely floccose-squamulose, white, the small even brownish disk squamose; lamellæ crowded, free, white then black; stem glabrous, white, with traces of an annulus near the thickened or subbulbous base; spores very large, elliptical, .0008'-.001' long, .0005'-.00065' broad.

Plant caespitose, 2-3' high, pileus 1'-2' broad, stem 1'' thick.

Ground in open fields. Ticonderoga. Aug.

The prominent characters of this species are the rimose pileus, squamose disk, free lamellæ, and large spores. In its early state it resembles some species of *Lepiota*. It seems to be intermediate between the sections *Atramentarii* and *Micacei*.

COPRINUS ROTUNDOSPORUS *Pk.*

Pileus thin, campanulate, whitish or pale cinereus with a thin floccose subpersistent tomentum, even; lamellæ free; stem slightly tapering upward, white; spores subglobose, .0003-.00035' long, nearly as broad.

Plant 2'-3' high, pileus about 1' broad.

About the roots of trees in woods. Catskill Mountains. Sept.

This species is apparently related to *C. niveus*, and is remarkable for its nearly globose spores. All the specimens seen were old and partly dried, so that the description is not as full as could be desired.

CORTINARIUS (PILEGMACIUM) COPAKENSIS *Pk.*

Pileus convex then expanded, often crowded and irregular, viscid, corrugated, pale-ochre, slightly tinged with red; lamellæ sub-distant, broad behind, at first violaceous, toothed or eroded on the margin, the interspaces sometimes veiny; stem equal or tapering upwards, stuffed, silky, whitish; spores broadly elliptical, rough, .0003'-.00035' long.

Plant subcaespitose, 2-3' high, pileus 1.5'-3' broad, stem 2''-4'' thick.

Ground in woods. Copake. Oct.

The pileus when dry is glabrous and shining.

CORTINARIUS (PHLEGMACIUM) LAPIDOPHILUS *Pk.*

Pileus at first hemispherical and cinereous, then convex or expanded and tinged with ochre, often crowded and irregular, virgate with appressed fibrils; lamellæ crowded, at first dark violaceous then argillaceous-cinnamon; stem solid, equal or slightly thickened at the base, whitish; flesh of the pileus whitish; spores unequally elliptical, rough, .0003 long, .00025' broad.

Plant subcæspitose, 2'-4' high, pileus 2'-3' broad, stem 3"-5" thick.

Rocky soil in woods. Ticonderoga. Aug.

MARASMIUS CALOPUS *Fr.*

Twigs and stems among fallen leaves in woods. Ticonderoga. Aug.

This might easily be mistaken for *M. scorodonius*, but it is without odor, and has a different insertion of the lamellæ. It is sometimes cæspitose. The pileus in our specimens is whitish.

BOLETUS SATANUS *Lenz.*

Borders of woods in grassy ground. Ticonderoga. Aug.

POLYPORUS PALLIDUS *Schulz.*

Adirondack Mountains. Aug.

POLYPORUS (MERISMA) BEATIEI *Banning in litt.*

Pilei few, springing from a common, often tuber-like base, spreading out into a suborbicular mass often a foot or more in diameter, nearly plane above or centrally depressed and imperfectly funnel-shaped, variously confluent and imbricated, sometimes single, subzonate, rough with little radiating elevations or wrinkles, which sometimes form imperfect reticulations towards the base, subpulverulent and strigose-villose in zones or almost evenly scabrous-villose, alutaceous, the margin often irregular and lobed; pores of medium size, decurrent on the stem-like base, unequal, angular, lacerated, toothed and even lamellated, generally about equal in length to the thickness of the flesh of the pileus, subconcolorous; flesh pallid or pale alutaceous, of a firm, but cheesy texture; spores globose, rough, .00025-.0003' in diameter, colorless.

"Ground" in woods. Wilmurt, Herkimer County. *G. S. Watkins* and *W. D. Edmonds*.

Ground under an oak tree. Brighton, Monroe County. *G. T. Fish*.

Both gentlemen from whom I have received specimens of this fungus, speak of it as growing on the ground, but it is quite probable that it starts from some decaying wood or tree root buried in the earth. I have also received a specimen of this plant from Miss M. E. Banning, of Baltimore, Md., who sent it under the name here given.

The species seems closely related to *P. subgiganteus* B & C., but as I am unable, from the description of that species, to satisfy myself that our plants belong to it, I have thought best to describe them under another name. The Baltimore plant has a single pileus seven inches in diameter and four inches high. The New York specimens are compound, the one from Wilmurt being ten inches broad and nine inches high, the one from Brighton, fifteen inches broad and six inches high. These are the dimensions of the shrunken, dried plants. When fresh, they were very much larger. The dimensions of the Wilmurt plant, when fresh, were given me by Mr. Edmonds, as follows:

Height, eighteen inches; circumference, fifty-seven inches; thickness of pileus about one inch. From this it will be seen that the dried plants are only about half their size when fresh. The flesh resembles in color and texture that of *P. sulphureus*, to which the species is allied, but it is a little harder. The dried plants have a decided and peculiar odor.

POLYPORUS (ANODERMEI) WEINMANNI Fr.

Decaying hemlock trunks. Pine Hill. Sept.

The whole plant sometimes acquires a reddish hue in drying. The pileus is two or three inches broad. A tendency to form narrow zones on the margin is manifest.

POLYPORUS (INODERMEI) PLANUS Pk.

Pileus thin, coriaceous, plane, suborbicular, about 1' broad, sometimes confluent, dorsally attached, minutely villose or velvety, brown or brownish fawn-colored, variegated with narrow darker glabrous zones, margin whitish; pores minute, obtuse, short, subrotund, whitish or pallid; flesh pallid.

Dead branches. North Greenbush.

This has the colors of *P. scutellatus*, but the thin plane pileus and short pores are so unlike that species that I am compelled to regard it as distinct.

POLYPORUS (RESUPINATI) SUBICULOSUS Pk.

Subiculum widely effused, dense, but soft and downy-tomentose, tawny-cinnamon; pores forming patches upon the subiculum, short, unequal, sometimes slightly labyrinthiform, cinereo-ferruginous, ferruginous-brown when bruised, the dissepiments when young whitish and pruinose-villose.

Creeping over mosses, decaying wood, and even stones, in sheltered places. Copake. Oct.

The patches are several inches in extent. The pores have a paler hue than the subiculum, but they become darker when bruised.

POLYPORUS (RESUPINATI) SEMITINCTUS Pk.

Subiculum thin, soft, cottony, separable from the matrix, whitish, more or less tinged with lilac, sometimes forming branching creeping threads; pores very short, unequal, whitish or pale cream-color, the dissepiments at first obtuse, then thinner, toothed on the edge.

Under surface of maple chips. Griffins. Sept.

This is a soft, delicate species, with meruloid pores, similar to those of *P. violaceus*. The lilac stains appear on the subiculum only.

POLYPORUS (RESUPINATI) INDURATUS Pk.

Effused, hard, determinate, 1"-2" thick, inseparable from the matrix, almost wholly composed of minute subrotund vesicular pores, yellowish or pale-ochre, the surface slightly pruinose and tinged with flesh-color; the yellowish mycelium or subiculum penetrating the matrix.

Decaying wood. Oneida. H. A. Warne.

This species is remarkable for the peculiar character of the pores which form little cells or cavities instead of tubes, so that in whatever direction the mass is cut or broken, the section appears equally porous. Perhaps this character will necessitate the formation of a new genus.

TRAMETES SUAVEOLENS *L.*

Decaying wood. Center. Oct.

SOLENIA VILLOSA *Fr.*

Decaying wood. Summit. Sept.

HYDNUM SULPHURELLUM *Pk.*

Subiculum thin, effused, definite, sometimes rimose, pale sulphur-yellow; aculei scattered, conical, subobtuse, sometimes compound, colored like the subiculum; spores oblong, slightly curved, .0002'-.00025' long.

Dead branches of mountain maple, *Acer spicatum*. Griffins. Sept.

The small suborbicular patches are sometimes elongated by confluence. The color is of a clear whitish sulphur hue. The teeth appear like little conical papillæ.

MUCRONELLA CALVA *A. & S.*

Prostrate hemlock trunks. Griffins. Sept.

MUCRONELLA AGGREGATA *Fr.*Decaying wood of deciduous trees. Oneida. *Warne.***CRATERELLUS DUBIUS** *Pk.*

Pileus infundibuliform, subfibrillose, lurid-brown, pervious to the base, the margin generally wavy and lobed; hymenium dark cinereous, rugose when moist, the minute crowded irregular folds abundantly anastomosing, nearly even when dry; stem short; spores broadly elliptical or subglobose, .00025'-.0003' long.

Plant simple or caespitose, 2'-3' high, pileus 1'-2' broad.

Ground under spruce trees. Adirondack Mountains. Aug.

In color this species bears some resemblance to *Cantharellus cinereus*. From *Craterellus sinuosus*, it is separated by its pervious stem, and from *C. cornucopioides* by its more caespitose habit, paler color and smaller spores.

STEREUM SANGUINOLENTUM *A. & S.*

Prostrate hemlock trunks. Griffins. Sept.

The pileus is sometimes hairy and distinctly zoned with darker bands; the hymenium is even or radiately-wrinkled.

CYPHELLA SULPHUREA *Batsch.*

Living stems of herbs in damp places. Griffins. Sept.

Some of the specimens were white when collected, but in drying, these assumed the yellow color of the others.

CLAVARIA FUMIGATA *Pk.*

Stem short, thick, branching from near the base, whitish; branches numerous, forming a dense mass, smoky-ochraceous, sometimes tinged with lilac; tips obtuse; spores .0003'-.0005' long.

Ground in woods. Ticonderoga. Aug.

The tufts are 4'-5' high and remarkable for their smoky or dingy color.

CLAVARIA CORYNOIDES *Pk.*

Small, simple, clavate; club obtuse, yellowish, or cream colored, gradually narrowed below and losing itself in the short white stem.

Gregarious, about half an inch high.

Damp ground by roadsides. Adirondaek Mountains. Aug.

TREMELLA LUTESCENS *Pers.*

Dead poplar branches. Adirondaek Mountains. Aug.

GUEPINIA PEZIZA *Tul.*

Cup-shaped, single or clustered, erumpent, stipitate, at first nearly closed, then open and concave, 1'-3" broad, yellow, often irregular, base stem-like, concolorous or slightly whitish-pruinose, longitudinally wrinkled, the ridges extending upwards on the base of the cup; substance tremelloid, rather tough; spores oblong-elliptical, at first simple, then one to three-septate, .0004'-.0005' long, borne on spicules at the tips of rather thick subelavate sporophores.

Dead alder. Center. Sept.

In the dried specimens the color inclines to orange. The general appearance is not unlike that of a clustered *Peziza*. As our specimens exhibit some characters not mentioned in the description of the species to which we have referred them, we have given a full description of them.

HYMENULA OLIVACEA *Pk.*

Thin, closely applied to the matrix, olive-green, shining, subviscid, definite or subconfluent, with a narrow raised margin which is sometimes whitish; spores minute, cylindrical, straight, trinucleate, colorless, .0002' long.

Dead stems of *Eupatorium ageratoides*. Catskill Mountains. Sept.

LYCOPERDON GLABELLUM *Pk.*

Subglobose or subturbinate, 1'-1.5' broad, sometimes narrowed below into a short stem-like base, furfuraceous with very minute nearly uniform persistent warts, which appear to the naked eye like minute granules or papillæ, yellow, opening by a small aperture; inner mass purplish-brown, capillitium with a central columella; spores purplish-brown, globose, rough, .0002'-.00025' in diameter.

Ground in copses and in pine woods. West Albany and North Greenbush. Autumn.

The verrucæ or spinules are so minute, that at first sight, they are scarcely visible, the peridium appearing nearly smooth. They persist even in the old and flaccid condition of the plant. The species is manifestly closely related to *L. atropurpureum*, but that is described as "at first rough with minute spines," thus indicating that it becomes smooth afterwards. It is also said to be "dingy-rufous," but our plant is constantly yellow.

LYCOPERDON CALYPTRIFORME *Berk.*

Moss-covered rocks. Adirondaek Mountains. Aug.

This species is remarkable for its peculiar shape and singular habitat. It is evidently rare. But two specimens were found.

MILLERIA *gen. nov.*

Peridium membranaceous, enclosing numerous minute sporangium-like bodies bearing upon the surface a stratum of spores.

This is a genus of Gasteromycetes, near Polysaccum. It is respectfully dedicated to its discoverer. *Mr. E. S. Miller.*

MILLERIA HERBATICA *Pk.*

Peridia oval or ovate-conical, subobtuse, firm, externally minutely warty or mealy-furfuraceous, whitish, inclosing a mass of minute subglobose or slightly angular sporangioles adhering together, black externally, pallid within; spores superficial on the sporangioles, globose, colored, .0005'-.00065' in diameter.

Panicles of *Rhynchospora macrostachya*. Wading River. *Miller.*

This rare, but interesting fungus resembles in size and color the preceding species, but its interior structure is wholly different. The sporangioles appear to be composed of densely compacted or reticulated threads and cellular matter. I have not been able to detect any investing membrane, the spores appearing to rest directly upon the surface to which they give the black color. The peridium does not appear to have been ruptured naturally in any of the specimens. The cavity is only partly filled by the mass of sporangioles.

PHYSARUM PSITTACINUM *Dittm.*

Fallen leaves, decaying wood, bark and effete Hypoxylon. Adirondack Mountains. Aug.

PHYSARUM ORNATUM *Pk.*

Sporangia depressed or hemispherical, plane or slightly concave beneath, greenish-cinereous, dotted with small yellow granules, the empty walls whitish; stem short, black or blackish-brown, generally longitudinally wrinkled when dry; columella none; capillitium with numerous yellow knot-like thickenings; spores globose, smooth, violet-brown in the mass, .0004'-.0005' in diameter.

Decaying wood. Albany. Aug.

PHYSARUM ATRORUBRUM *Pk.*

Scattered or gregarious, stipitate; sporangia globose, even or somewhat wrinkled, dark-red; stem cylindrical, even, blackish or subconcolorous; capillitium when cleared of the spores whitish, sometimes with a slight pinkish tinge; columella none; spores globose, smooth, dark-brown in the mass, dark-red when separated, .0003-.00035' in diameter.

Decaying wood. Adirondack Mountains. Aug.

The plants are scarcely one line high. The capillitium is very delicate, and when cleared of the spores, the knot-like thickenings are seen to be very small and of a dark-red color, to which probably is due the pinkish tinge—sometimes observed. A part only of the thickenings are filled with lime granules. The dark-red granules of the sporangium walls are abundant, and appear to form a continuous crust.

PHYSARUM INÆQUALIS *Pk.*

Sporangia sessile, subglobose or irregular, sometimes elongated and confluent, red, abundantly dotted with minute scarlet granules; capillitium

lemon-yellow; spores brown in the mass, globose or subglobose, smooth, very unequal in size, .0003–.0012' in diameter.

Decaying wood. Griffins. Sept.

This is a most singular fungus, and but little of it was found. The capillitium though abundantly charged with lime granules, does not appear to have them continuous throughout its whole extent, and the plant would, therefore, seem to belong to the genus *Physarum*. On the other hand, the larger bodies which I have regarded as spores, give indications that they may be really an investing membrane, which encloses the true spores, for they are often found ruptured, though I have not been able to see them discharging spores or containing them. They are colored like the spores, and there are all manner of intermediate sizes between the largest and smallest. It thus appears to be neither a good *Physarum* nor a good *Badhamia*, though with close relations to both. For the present, I leave it in the genus *Physarum*. *P. rubiginosum* is said to have the sporangia walls and the granules of lime—both scarlet—which is not the case with our plant.

BADHAMIA AFFINIS R.

Twigs and leaves. Sandlake. Aug.

DIDYMIUM EXIMIUM Pk.

Sporangia subglobose, slightly umbilicate beneath, whitish or subeinerous, mealy with numerous granules; stem slender, erect, even, pallid or subrufescent, blackish at the base; columella orbicular, discoid, dull-yellowish or pallid; capillitium whitish; spores globose nearly smooth, blackish in the mass, .00035'–.0004' in diameter.

Fallen leaves. Adirondack Mountains. Aug.

I have not seen the full description of *D. discoideum*, which is also said to have a discoid columella, but as its capillitium is said to be brown, it is probably distinct from this species. In our plant the sporangium, after bursting at the top, sometimes breaks loose from the stem and slides downwards, thus protruding and revealing to sight the flattened disk-like columella.

DIDYMIUM ANGULATUM Pk.

Sporangia delicate, subglobose, whitish, externally mealy with numerous granules and crystals of lime; stem short, whitish; columella subglobose, white or pale yellow; capillitium sparse, delicate, whitish or slightly colored; spores irregular, angular, blackish in the mass, .00035'–.0005' long.

Fallen leaves. Adirondack Mountains. Aug.

CHONDRIODERMA DIFFORME Pers.

Fallen leaves, bark and fern stems. Adirondack Mountains. Aug.

DIACHÆA SUBSESSILIS Pk.

Gregarious or crowded; sporangia subglobose, sessile or with a very short white stem, the walls delicate, iridescent with various metallic tints; columella obsolete; capillitium and mass of spores violet-brown; spores globose, rough, .0004'–.0005' in diameter.

Fallen leaves. Adirondack Mountains. Aug.

This is a most singular species, and apparently very rare. In its lack of a distinct columella, it departs from the generic character, but it cannot be placed

in the genus *Lamproderma*, for the same objection would hold there, and besides that, another is found in the presence of lime granules in the stem. Even when no distinct stem is present, a small whitish mass of granules can generally be seen at the point of attachment. The capillitium appears to originate at the base of the sporangium. The spores are larger, but less rough than those of *D. splendens*.

COMATRICHA ÆQUALIS *Pk.*

Gregarious or loosely clustered, about three lines high, arising from a thin hypothallus; sporangia cylindrical, obtuse, fugacious, wholly falling away; capillitium brown or blackish-brown, forming an intricate net-work; stem slender, smooth, black, penetrating the capillitium as a columella and extending nearly or quite to the apex, the free portion about equal in length to one-half the altitude of the entire plant; spores globose, smooth, violet-black, .0003'-.00035' in diameter.

Decaying wood. Catskill Mountains. Sept.

In color this species is almost exactly like *Stemonitis fusca*, from which its more lax habit, proportionally longer stem and different capillitium separate it. The larger size, both of the plant itself, and of the spores, will separate it from *Comatricha typhina*. The length of the stem and of the capillitium are nearly equal, hence the specific name.

COMATRICHA FRIESIANA *De By.*

Decaying wood. Adirondack Mountains. Aug.

This is a variety with the sporangia generally globose.

The variety *oblonga* was found on the Catskill Mountains.

COMATRICHA PULCHELLA *Bab.*

Decaying stems of herbs. Adirondack Mountains. Aug.

LAMPRODERMA VIOLACEUM *Fr.*

Dead stems of herbs. Catskill Mountains. Sept.

Our specimens have a brownish capillitium and spores .0003'-.00035' in diameter, but they are probably a mere variety of the species.

TRICHIA SCABRA *R.*

Decaying wood. Griffins. Sept.

TRICHIA INCONSPICUA *R.*

Bark of buttonwood, *Platanus occidentalis*. Bethlehem.

ARCYRIA POMIFORMIS *Roth.*

Decaying wood and bark. Mechanicville. Oct.

LYCOGALA FLAVOFUSCUM *Ehr.*

Decaying wood and stumps. Griffins and Bethlehem. Sept. and Oct.

OLIGONEMA BREVIFILA *Pk.*

Bright ochery-yellow throughout; sporangia crowded, forming clusters or effused patches, shining, variable in shape; threads few, very short, cylindrical or subfusiform, not septate; spores globose, rough, .00045' in diameter.

Mosses. Oneida. Warne.

This species differs from *O. flavida* (*Perichæna flavida* Pk.) in its darker color and shorter, more strongly marked threads.

SACIDIUM PINI Fr.

Dead balsam leaves. Adirondack Mountains and Summit. Aug. and Sept.

SEPTORIA WALDSTEINIAE P. & C.

Spots small, unequal, suborbicular, arid, gray with a purple-brown or blackish margin, perithecia minute, few, epiphyllous, black; spores straight, .001' long.

Leaves of dry strawberry, *Waldsteinia fragarioides*. Portage. G. W. Clinton. Helderberg Mountains. May.

SEPTORIA VERBASICOLA B. & C.

Leaves of mullein, *Verbascum blattaria*. Albany. July.

I find no description of this fungus, and take the name from specimens received from Dr. Curtis.

PHYLLOSTICTA LONICERÆ Desm.

Living leaves of fly honeysuckle, *Lonicera ciliata*. Catskill and Adirondack Mountains. July and Aug.

VERMICULARIA TRICHELLA Grev.

Ivy leaves. Buffalo. Clinton.

VERMICULARIA ALBOMACULATA Schw.

Leaves of carrion flower, *Smilax herbacea*. Buffalo. Sept. Clinton.

MELANCONIUM AMERICANUM P. & C.

Pustules small, grouped or circinating on orbicular spots; stroma none or obsolete; spores compact, oozing out in subconical masses, staining the matrix black, subglobose or broadly elliptical, .0002-.0003' long.

In conservatories on dead leaves of the American century plant, *Agave Americana*. Buffalo. Feb. Clinton.

SPORIDESMIUM SICYNUM Thum.

Dead alder branches. Adirondack Mountains. Aug.

PHRAGMIDIUM BULBOSUM Fr.

Leaves of *Potentilla fruticosa*. Copake. Oct.

The spores are darker colored than in European specimens, and therefore the septa are soon very obscure.

UROMYCES TRIFOLII Fekl.

Leaves of *Medicago lupulina*. Buffalo. Clinton.

UROMYCES POLYMORPHUS P. & C.

Spots brownish; sori blackish-brown, prominent, surrounded by the ruptured epidermis; spores large, polymorphous, subglobose, elliptical, ovate, oblong or clavate, often angular, the apex acute, obtuse, truncate or even emarginate, .0014-.002 long; pedicel equaling or exceeding the spore in length.

Lower surface of leaves of *Lathyrus ochroleucus*. Buffalo. Nov. Clinton.

USTILAGO SALVEI B. & Br.

Leaves of *Calamagrostis Pickeringii*. Mt. Marcy. Aug.

This fungus forms long discolored lines or patches on the leaves, closely resembling those formed by *Urocystis Agropyri* and *Urocystis occulta*. The spores in our specimens, as well as in those received from Europe under this name, are quite uniformly globose, not obovate as given in the description. They are generally .0004'-.0006' in diameter, but occasionally they attain a diameter of .001'. I am not aware that this species has been before detected in this country.

MASSOSPORA, *gen. nov.*

Spores numerous, loosely adhering together and forming a pulverulent mass without any evident peridium. *Insecticolous*.

This is a peculiar genus, apparently belonging to the Coniomycetes, but its affinities are doubtful.

MASSOSPORA CICADINA Pk.

Spore mass occupying the abdominal cavity, whitish or pale cream-color, at length exposed by the falling away of the terminal rings of the abdomen; spores subglobose or broadly elliptical, granular within, sometimes containing one to three unequal nucleoli or oil globules, .00065'-.00085' in diameter.

In the abdomen of the "Seventeen-year Locust," *Cicada septendecim*. Livingston, Columbia county, and Albany. June.

A specimen was also received from Rev. R. B. Post, which was taken at South Amboy, New Jersey.

This is a singular fungus, unlike any other known to me. In its early stage it is wholly concealed in the body of the insect, but just before, or soon after the death of the insect, the terminal rings of the abdomen fall away, revealing the pulverulent mass of spores within, which, by a superficial observer, might easily be mistaken for a lump of pale-yellow or whitish clay. I have not been able to detect any proper peridium, nor does any seem to be necessary, the walls of the abdomen answering as a substitute. In one or two examples, the spore mass was less fully developed, and of a brighter color. The spores, in this case, were much larger, being .0015'-.002' in diameter, with the epispore roughly reticulated. This is probably an earlier condition of the same species, and is another indication that the proper position of the fungus is among the Coniomycetes, where there are several genera, with spores of two orders. The position of the genus, as it seems to me, is in the vicinity of the genus *Protomyces*, which has the spores developed in the living tissues of plants, as this has in the tissues of insects. This fungus is noticed, but not named, in Smithsonian Contributions, Vol. v, p. 53.

ISARIA TENUIPES Pk.

Stem very slender, elongated, glabrous, lemon-yellow, one to one and a half inches high, divided above into a few irregular branches, which are wholly covered by the white mealy coating of conidia; conidia oblong-elliptical, .00016'-.0002' long.

Dead pupæ buried under fallen leaves. Center. Sept.

This is probably only a condition of some *Torrubia*; but, as it does not agree with any described form, I have thought best to designate it, for the present, by a name of its own.

STILBUM RIGIDUM Pers.

Decaying wood. Adirondack Mountains. Aug.

STILBUM FLAVIPES Pk.

Stem villose, tapering upward, less than a line high, buff-yellow; head small, subglobose or hemispherical, whitish; spores minute, elliptical, .0001'-.00012' long.

Decaying wood. Center. Oct.

SPOROBYE ABIETINA Pk.

Very minute; stems slender, distinctly septate, nearly black, terminating above in a minute obovate or subglobose yellowish head; spores minute, oblong, spermatoid.

Bark and wood of spruce, *Abies nigra*.

Specimens of spruce bark and wood, showing the work of the spruce mining beetle were collected in the Adirondack Mountains. These were wrapped in paper, brought to Albany, and laid away. Upon examining them some months afterward, the fungus was found upon them, having evidently developed since the collection of the bark. It is about the size of *S. byssoides*.

CLADOSPORIUM GRAMINUM Lk.

Dead leaves of grass and sedges. Center and North Greenbush. May.

HELMINTHOSPORIUM INTERSEMINATUM B. & R.

Dead stems of stone root, *Collinsonia Canadensis*. North Greenbush. Oct.

HELMINTHOSPORIUM HYDROPIPERIS Thum.

Living leaves of smart weed, *Polygonum Hydropiper*. Albany. Sept.

POLYACTIS VULGARIS Lk.

On carnation pink in conservatories. Buffalo. Dec. Clinton.

BOTRYOSPORIUM PULCHRUM Berk.

Dead grass leaves. Center. Sept.

In our specimens the tips of the branches are swollen; otherwise they agree with the description of the species.

ASPERGILLUS FLAVUS Lk.

On excrement of caterpillars in damp places. North Greenbush and Sandlake. July and Aug.

FUSIDIUM CANUM Pass.

Leaves of *Erigeron Canadensis*. North Greenbush. Sept.

PERONOSPORA SIMPLEX Pk.

Flocci somewhat tufted, short, .004'-.006' long, simple, bearing on the swollen obtuse apex five to fifteen cylindrical spicules, whose length is about half the diameter of the aërospores; aërospores borne on the spicules, globose, generally with a broad umbo at the apex, and a minute projecting point of attachment at the base, .0008'-.0012 in diameter.

Living and languishing leaves of the New England Aster, *Aster Novæ-Angliæ*. North Greenbush. Sept.

MUCOR RAMOSUS Bull.

Decaying fungi. Albany. Sept.

MUCOR CANINUS Pers.

Excrement of dogs. Ticonderoga. Aug.

PEZIZA SUCCOSA Berk.

Damp shaded soil in woods. Albany and North Greenbush. July.

PEZIZA VULCANALIS Pk.

Burnt ground under spruce trees. Adirondack Mountains. Aug.

This is regarded by some as equivalent to *P. cupularis*, but if the figure and description of *P. cupularis* in Mycographia are correct, our plant should be kept separate. It is not "subsessile," but it always, so far as I have seen, has a distinct stem. Its color, externally, is brown or ochraceous-brown, and the disk is orange or yellow-orange, not of a uniform cervine color without and within as figured. Neither is it "externally farinose;" and finally the spores are considerably smaller and destitute of nuclei. Indeed, our plant approaches nearer to *P. pulchra* than to *P. cupularis* as given in Mycographia, and I would not be averse to regarding it equivalent to that species. But if these two are the same, the name *P. vulcanalis* antedates the other and should be retained.

PEZIZA (HUMARIA) GALLINACEA Pk.

Cups whitish or yellowish, expanded, sessile, attached by a slight projecting point, externally slightly furfuraceous, the margin often wavy or irregular, the hymenium smooth, sometimes uneven; asci long, slender, cylindrical; spores elliptical, smooth, uniseriate, occupying the upper part of the ascus, .0003-.0004 long; paraphyses slender, slightly clavate at the tips.

Partridge dung. Oneida. July. Warne.

PEZIZA UMERORUM Eckl.

Clay soil. Oneida. Warne.

PEZIZA SULPHUREA Pers.

Dead stems of herbs in damp places. Albany. Sept.

PEZIZA (DASYSCYPHÆ) VIRIDICOMA Pk.

Cups minute, sessile, villose, yellowish-green; asci oblong clavate; spores crowded or biseriate, oblong or subfusiform, .0005-.0006' long, .0002'-.00025' broad.

Decaying wood. Sandlake. Aug.

The peculiar color of this minute species renders it an attractive object.

PEZIZA BRUNNEOLA Desm.

Fallen leaves. Center. June.

PEZIZA OSMUNDÆ C. & E.

Near the base of Osmunda stems. Center. Sept.

PEZIZA (MOLLISIA) PLANODISCA P. & C.

Cups minute, sessile, whitish, the disk plane or slightly convex, obliterating the margin; asci short; spores crowded or biseriate, subfusiform, .0003'-.00035' long.

Dead leaves of grass, *Andropogon scoparius*. Buffalo. Nov. Clinton.

HELOTIUM ALBOPUNCTUM *Pk.*

Cups very minute, scattered, white, the disk soon plane or slightly concave, margin generally distinct; asci cylindrical; spores biseriate, oblong, narrow, generally binucleate, .0006'-.0007' long.

Fallen beech leaves in woods. Adirondack Mountains. Aug.

This is an exceedingly minute species. In drying it acquires a yellowish tinge, and it is then scarcely visible to the naked eye. The stem is so short that the plant appears sessile.

HÆMATOMYCES ORBICULARIS *Pk.*

About one line in diameter, sessile, pulvinate, orbicular, subtremlloid, gyrose-convolute, blackish-brown, minutely dotted with rufous particles, as is also the moist pallid or subrufous spot on which it is seated; asci narrowly clavate, subacute; spores oblong-fusiform, simple, .0006'-.0007' long, .00015' broad; paraphyses numerous, filiform.

Decaying chestnut wood. Mechanicville. Oct.

I have seen no description of this genus, and refer our specimens to it, because of their congeneric relation to *Hæmatomyces vinosus* C. & E.

DERMATEA CARNEA *C. & E.*

Dead Viburnum stems. West Albany. Oct.

DERMATEA PHYLLOPHILA *Pk.*

Cups minute, suborbicular, often with a flexuous margin, dry, somewhat fibrous in texture, brownish and slightly hairy externally, erumpent, surrounded and partly concealed by the ruptured epidermis, sometimes throwing off a fragment of it, when moist, expanded and revealing a plane pallid or dingy-white disk; asci oblong-clavate, obtuse, sessile; spores broadly elliptical, nearly colorless, .0003'-.00035' long, .0002'-.00025' broad, generally containing a large shining nucleus; paraphyses thickened above, often a little longer than the asci.

Lower surface of balsam leaves while yet on the tree. Summit. Sept.

At first sight this fungus might be taken for some effete *Peridermium*, such is its general external appearance. When moist the cups are swollen and become more distinct. Under a lens the disk has a pruinose appearance. The leaves that are attacked are killed by the fungus, all those bearing it being dead, though in the immediate vicinity of living ones.

DERMATEA XANTHOXYLI *Pk.*

Cups densely tufted, minute, often irregular from mutual compression, brownish-lilac, externally and on the margin whitish with a villose pruinosity, disk plane or slightly concave; asci short, clavate; spores crowded, simple, slightly curved, subcylindrical, obtuse, colorless.

Dead branches of prickly ash, *Xanthoxylum Americanum*. West Troy. Oct.

The tufts are scarcely a line broad and easily overlooked, yet they sometimes contain a dozen cups each.

CENANGIUM CASSANDRÆ *Pk.*

Oblong or hysteriiform, erumpent, closely surrounded by the ruptured epidermis, black; asci oblong-clavate; spores linear, curved, involved in mucus, slightly colored, .0011'-.0012' long.

Dead stems of leather leaf, *Cassandra calyculata*. Center. June.

CENANGIUM PEZIZOIDES *Pk.*

Cups scattered, minute, erumpent, sessile or attached by a narrowed base, smooth, black; asci oblong-clavate; spores crowded oblong-elliptical, .0008'-.001' long, often containing a single large nucleus, sometimes slightly curved.

Dead stems of leather leaf, *Cassandra calyculata*. Center. June.

This was associated with *C. Cassandra*, but the two are easily distinguished.

TYMPANIS ACERINA *Pk.*

Cups subcaespitose, obconic, erumpent, black with a distinct often flexuous margin, disk concave; asci oblong-cylindrical; spores oblong, colored, .0005'-.0008' long, containing a granular endochrome, at length quadrinucleate or triseptate.

Bark of maple trees. Adirondack and Catskill Mountains. Aug. and Sept.

The cups often manifest a tendency to form lines or grow in linear tufts. They are usually accompanied by *Sphæronema acerina*, which is probably one condition of the species. Both frequently grow from the same chink in the bark.

PATELLARIA OLIVACEA *Batsch.*

Decaying wood. Adirondack and Catskill Mountains. July and Sept.

A form of this species occurs which is hispid with straight rigid black hairs or setæ.

PHACIDIUM BRUNNEOLUM *Pk.*

Perithecia small, innate, brown or blackish-brown, with four or five rather broad teeth; disk dingy-white; asci cylindrical or clavate, narrow; spores small, colorless, sublanceolate or oblong-ovate, often binucleate, .0003-.0004' long.

Fading leaves of *Galium trifidum*. Summit. Sept.

I have seen no description of *Phacidium autumnale* Fekl., but according to my European specimens of that species, our plant is quite different.

TRIBLIDIUM MORBIDUM *Pk.*

Perithecia seated on a thin black crust, irregular, elliptical or oblong, rugose, black, at length widely gaping or even suborbicular, revealing the dingy-white or cinereous disk; asci narrowly lanceolate, tapering towards the base; spores filiform, .003'-.004' long.

Decaying prostrate trunks of spruce. Sandlake. Aug.

The general appearance of the perithecia is such as to suggest the idea that they are diseased or badly developed. They indicate that the plant is a *Triblidium*, but the spores are like those of *Colpoma*.

GLONIUM HYALOSPORUM *Ger. in litt.*

Decaying wood. Willowemoc. W. R. Gerard.

HYPODERMA NERVESEQUUM *DC.*

Leaves of balsam. Mt. Marcy and Summit.

The specimens are without fruit, but so closely resemble European specimens that I have no hesitation in referring them to this species.

RHYNTHISMA MAXIMUM *Fr.*

Living stems of willows, *Salix sericea*. Stamford, Delaware county. Sept.

This is also without fruit, but so characteristic in other respects, that there can scarcely be a doubt of its identity. It kills the stems and branches it attacks.

HYPOCREA VIRIDIS *Tode.*

Maple chips. Griffins. Sept.

This is so unlike our ordinary forms of *H. gelatinosa*, that it seems best to keep them distinct, though some botanists unite them.

HYPOXYLON XANTHOCREAS *B. & C.*

Prostrate dead alders. Center. Sept.

Our specimens agree with those received from Dr. Curtis under this name, but they do not agree with the description of the species as published in Grevillea. In our specimens the young plant is covered with a compact yellow conidiiferous stratum bearing elliptical conidia .00016-.0002 long. As the stroma increases in size, it becomes naked above, and of a purple-brown or chestnut color, which contrasts beautifully with the yellow margin. When old it becomes darker, but I have not seen it "black" as described. The surface is generally irregular or uneven. The stroma is whitish or pallid within, but near the surface it is yellow. The spores vary from .0004'-.0006' in length. I find none, neither in our specimens, nor in those of Dr. Curtis, as small as stated in the description. But for the examples of Dr. Curtis, I should have regarded our plant as a different species, so widely does it differ from the description.

DIATRYPE ASTEROSTOMA *B. & C.*

Birch bark. Oneida. Warne.

DOTHIDEA EPILOBI *Fr.*

Dead stems of willow herb, *Epilobium angustifolium*. Adirondack Mountains. Aug.

VALSA TRANSLUCENS *De Not.*

Dead willow branches. West Albany. Apr.

VALSA XANTHONYLI *Ph.*

Pustules slightly prominent, erumpent, with a yellowish or tawny furfuraceous disk which is dotted by the ostiola; perithecia two to fifteen, rarely single, fragile, pale, surrounded by a tawny tomentum, which is sometimes agglutinated into a kind of spurious receptacle; ostiola distinct, short, obtuse, black, at first suffused with a yellowish-green powder; asci subcylindrical; spores crowded or biseriate, oblong, obtuse, straight or slightly curved, .0008'-.001' long, .0003' broad, three to five-septate with an occasional longitudinal septum, at first colorless, then yellowish.

Dead branches of prickly ash, *Xanthoxylum Americanum*. West Troy. Oct.

The species belongs to the *Pseudovalsa* series.

VALSA CRATÆGI Curr.

Dead ash branches. Catskill Mountains. Sept.

Our specimens do not fully agree with the description of the species to which we have referred them, but the differences are not very decided.

LOPHIOSTOMA SCELESTUM C. & E.

Decaying wood of apple tree. Helderberg Mountains. May.

LOPHIOSTOMA PROMINENS Pk.

Perithecia very prominent, hemispherical, adnate at the base, .07-.08' broad, smooth, black; ostiola distinct, compressed, black, shining; asci subclavate; spores biseriate, oblong or subfusiform, straight or slightly curved, colored, five-septate, .0008-.001' long.

Dead twigs of button-bush, *Cephalanthus occidentalis*. Center. June.

The species is related to *L. bienspidatum*, but the perithecia are not immersed, and the spores are destitute of cuspidate points and longitudinal septa.

MASSARIA GIGASPORA Desm.

Dead branches of sheep-berry, *Viburnum Lentago*. Albany. May.

The spores in our specimens are .003' long, and quadrilocular with the two central cells shorter than the terminal ones.

SPHÆRIA (VILLOSÆ) PULCHRISETA Pk.

Perithecia very minute, .003'-.004' in diameter, superficial, numerous, at length collapsing, black, beautifully hispid with straight diverging black setæ; asci narrowly fusiform or lanceolate; spores narrow, subfusiform, colorless, .00025'-.0003' long, the endochrome sometimes parted in the middle.

Chips in woods. Griffins. Sept.

Externally this fungus has the appearance of some species of *Venturia*, but it appears to have paraphyses among the asci.

SPHÆRIA FIMISEDA Ces. & De Not.

Excrement of cows. Oneida. Warne.

SPHÆRIA CLADOSPORIOSA Schw.

Old *Polyporus sulphureus*. Buffalo. Apr. Clinton.

This, as Berkeley remarks, is not a true *Sphæria*, but as the specimens are not in condition to show its true relations, it is left where Schweinitz placed it.

SPHÆRIA PHELLOGENA B. & C.

Corky bark of elm. Bethlehem. May.

SPHÆRIA (CAULICOLÆ) CURVICOLLA Pk.

Perithecia small, .03'-.04' broad, scattered or two to three confluent crowded, erumpent, at length naked, hemispherical, black; ostiola short, subcylindrical, slightly curved; asci oblong; spores crowded or biseriate, colorless, .0006'-.0009' long, .0003' broad.

Dead stems of *Polygonum articulatum*. Center. Oct.

The noticeable character of this species is its short curved ostiolum, which is usually bent upwards toward the top of the stem on which the *Sphaeria* grows. It is generally cylindrical, but sometimes slightly attenuated, sometimes a little compressed.

SPHERIA (CAULICOLÆ) SORGHIPHILA *Pk.*

Perithecia very minute, immersed, erumpent through a longitudinal chink, elliptical, black; asci elongated, clavate; spores biseriate, oblong-cylindrical, triseptate, constricted at the septa, pale when young, then colored, .0011'-.0012' long.

On the brush of an old broom. North Greenbush. June.

The ostiola are so obscure that they can with difficulty be seen.

SPILERIA TYPHÆ *Schw.*

Decaying leaves of *Typha latifolia*. Greenbush. May.

SPHERIA GNOMON *Tode.*

Fallen leaves of *Ostrya Virginica*. West Troy. June.

SPILERIA CREPINI *West.*

Spikes of club-moss, *Lycopodium annotinum*. Mount Marey. Aug.

The affected spikes become conspicuous by reason of the discoloration produced by the parasite. The scales appear slightly thickened or the epidermis a little elevated by the tomentose stratum beneath it.

SPILERIA MARCIENSIS *Pk.*

Perithecia minute, punctiform, covered by the epidermis, which is ruptured by the distinct slightly prominent blunt ostiola; asci oblong-cylindrical, sessile; spores crowded, subfusiform, blunt, slightly colored, triseptate, .001'-.0011' long, .0003' broad, the cells generally nucleate.

Leaves of club-moss, *Lycopodium annotinum* and *L. Selago*. Mount Marey. Aug.

This species, though closely related to the preceding, is clearly distinct. It inhabits only the leaves, has no investing tomentum, has a more decided ostiolum and longer spores. The matrix is not discolored by it.

VENTURIA DICKIEI *De Nol.*

Leaves of twin-flower, *Linner borealis*. Mount Marey. Aug.

I am not aware that this interesting little fungus has before been detected in this country.

(5.)

NEW STATIONS, NOTES AND OBSERVATIONS.

CIMICIFUGA RACEMOSA *Ell.*

Schodack, Rensselaer county. *Rev. H. Wibbe.* All the specimens of this plant that I have seen have the pods supported on a short stalk or pedicel, as figured and described by Dr. Torrey in the New York State Botany, although they are described in both the Manual and Class Book as sessile.

VIOLA CANADENSIS *L.* was observed in flower near Griffins, as late as the middle of September.

HYPERICUM PYRAMIDATUM *Ait.*

Near "Ball's Head," Rensselaer county. *Wibbe.*

ELATINE CLINTONIANA *Pk.*

Having recently reëxamined and compared the seeds of this plant and *E. Americana*, I find that the seeds vary somewhat, and that the differences which I formerly observed vanish when many specimens are compared. I am, therefore, of the opinion that the former is merely a dwarf state of the latter.

IMPATIENS FULVA *Nutt.*

A white-flowered form. Irondequoit. *G. T. Fish.*

RHUS TYPHINA *L.*

Apparently a hybrid between this and *R. glabra*. Fort Edward. *M. W. Vandenburg.*

POTENTILLA RECTA *L.*

Oswego. *Wibbe.*

LYTHRUM SALICARIA *L.*

River banks, near Oswego. *Wibbe.*

LONICERA CÆRULEA *L.*

Plentiful on the borders of Lake Tear. Mount Marcy.

NARDOSMIA PALMATA *Hook.*

Guilderland, Albany county.

SOLIDAGO LATIFOLIA *L.*

Apparently a hybrid between this and *S. cæsia*. Fort Edward. *Vandenburg.*

SOLIDAGO RIGIDA *L.*

Plentiful along the Harlem railroad at Copake. This is probably one of its most northern stations.

HIERACIUM AURANTIACUM *L.*

Meadows near Oswego. *Wibbe.* This plant appears to be rapidly spreading over the State.

VACCINIUM CORYMBOSUM *L. v. ATROCOCCUM Gr.*

This strongly marked variety occurs in Sandlake.

ATRIPLEX HASTATA *L.*

Spreading and becoming rather common about Albany.

MONTELIA TAMARISCINA *Nutt.*

Shore of Lake Champlain at Tieonderoga.

ULMUS AMERICANA *L.*

A corky-bark form of this tree occurs in the vicinity of Albany. The corky portion is in layers parallel to the surface of the trunk. I have not observed it on the branches.

SALIX MYRTILLOIDES *L.*

Marshes near Center, Albany county.

POTAMOGETON OAKESIANUS *Robbins.*

Wading River. *Miller.*

HABENARIA CILIARIS *R. Br.*

This most beautiful plant was detected near Manlius, by *Mr. Wibbe.*

TRILLIUM ERYTHROCARPUM *Me.*

A monstrosity in which all the parts, except the stem and stigmas, appear to be double. There are six leaves, six sepals, six petals, twelve stamens, and apparently two ovaries closely united. The stigmas are numerous, but I have not been able to count them accurately. Oswego. *Wibbe.*

CHAMÆLIRIUM LUTEUM *L.*

Near Nassau, Rensselaer county. *Wibbe.*

SCIRPUS ERIOPHORUM *Me.* v. CYPERINUS *Gr.*

Oswego. *Wibbe.*

RHYNCHOSPORA MACROSTACHYA *Torr.*

Shore of "Mud Pond," five miles southwest of Oswego. *Wibbe.*

BROMUS TECTORUM *L.*

Along the Hudson River railroad. Greenbush.

TRITICUM CANINUM *L.*

Buffalo. *Clinton.* This is a remarkable variety in which the leaves are involute and the sheaths hairy.

ASPIDIUM SPINULOSUM *Sw.* v. DUMETORUM *Sm.*

Syracuse. *Mrs. S. M. Rust.*

ASPIDIUM CRISTATUM *Sw.* v. CLINTONIANUM *Eaton.*

Buffalo. *Clinton.*

ASPIDIUM ACULEATUM *Sw.* v. BRAUNII *Koch.*

This beautiful fern proves to be more common than was at first supposed. I have observed it in three new localities the past season. Near Summit, Schoharie county; near Griffins, Delaware county; and in the Catskill Mountains, near Big Indian.

ONOCLEA SENSIBILIS *L.* v. OBTUSILOBATA *Torr.*

Syracuse. *Mrs. Rust.*

BOTRYCHIUM LUNARIA *Sw.*

Mrs. Rust sends specimens of this interesting fern from the original locality near Syracuse, where she first discovered it. She writes that the plants occur in but one little spot, and, with most commendable care for the preservation of the fern, she says that she cautiously plucks a few without taking them up by the roots. We sincerely hope that others who may possess the knowledge of this single New York locality, may be equally careful not to destroy it. It is greatly to be regretted that the locality of *Woodsia glabella*, at Little Falls, has been exhausted, and its loss should stimulate all true lovers of nature to be careful of such rare gifts.

Mrs. Rust finds, in Onondaga county, thirty-seven of the fifty species of ferns that have been detected in the State.

BOTRYCHIUM SIMPLEX *Hitch.*

Near Oswego. *Wibbe.*

BOTRYCHIUM LANCEOLATUM *Angst.*

Pine Hill, Ulster county.

AGARICUS RADICATUS *Relh.*

Two forms of this species occur here, one with a rather stout smooth stem, the other with a more slender stem covered with minute scurfy particles. The former agrees with the description of the species, the latter does not. This last is the most common form with us.

AGARICUS RUGOSODISCUS *Pk.*

This Agaric, when wounded, exudes a serum-like juice. It belongs to the subgenus *Collybia* rather than to *Omphalia*, and should be placed near *A. succosus*.

AGARICUS LACCATUS *Scop.*

This wonderfully variable species sometimes has the lamellæ notched behind precisely as in the subgenus *Tricholoma*.

AGARICUS HÆMATOPUS *Pers.*

I find a non-cæspitose form of this species with red-margined lamellæ. Its red juice, however, will serve to distinguish it and show its true relations.

AGARICUS SARCOPHYLLUS *Pk.*

This species, which was discovered in 1869, and had not since been found by me, reappeared this season in a pasture near Ticonderoga. It is very rare.

AGARICUS ARVENSIS *Schæff.*

In an oat field. Ticonderoga.

AGARICUS SEROTINOIDES *Pk.*

I am satisfied that this is a mere variety of *A. serotinus*, and should not be kept distinct. It is probable also that *A. perplexus* *Pk.* is only an American variety of *A. sublateritius*, from which it scarcely differs except in the color of the lamellæ.

COPRINUS ANGULATUS *Pk.*

The description of this species was drawn up from dried specimens, and is therefore inaccurate. It is here revised.

Pileus thin, campanulate or convex, rimose-sulcate, sub-fuscous, disk squamose, with a few brownish sub-persistent verruæ; lamellæ narrow, close, free; stem equal or slightly tapering upward, hollow, white; spores black, triangular-ovate, compressed, .0003'-.0004' long, .0003' broad, .0002 thick.

CANTHARELLUS AURANTIACUS *Fr.*

Center. A variety with the lamellæ nearly white.

TROGIA ALNI *Pk.*

The spores are very minute, narrow, cylindrical, slightly curved, colorless, .0002-.00025' long.

POLYPORUS SCUTELLATUS *Schw.*

This species, as it occurs with us, is generally dimidiate, and more or less unguulate. The pores are not distinctly rhomboidal in most cases, nor have I seen them changed to a black color. In unguulate specimens they are elongated, and, in length, much exceed the thickness of the hymenophorum. In the young

state the pileus is clothed with a minute velvety villosity, but this disappears with age, and the pileus becomes either uniformly black or blackish variegated with paler zones, rarely wholly pale. I have met with it both on alder and witch-hazel.

RETICULARIA UMBRINA Fr.

In Dr J. Rostafinski's Monograph of the Myxogasters, *Reticularia lycoperdon* Bull. has been substituted for the name in common use. This Monograph, being based on an entirely new system of Classification, necessitates a change of name in numerous instances. How thoroughly different the system, and how wide spread the change of names therein inaugurated may be inferred from the following facts. Of the hundred or more species given in the Handbook of British Fungi less than one-fourth remain under their old names. Three out of the four species of *Reticularia* are referred to as many different genera, leaving one species only in the genus and another specific name is given to that one. The generic name *Fuligo* takes the place of *Æthalius*, and the two supposed species, *Æ. septicum* and *Æ. vaporarium*, help make up a page of synonyms under the name *Fuligo varians*. The genus *Diderma* is discarded and its thirteen species are distributed among three genera, *Chondrioderma* taking the largest share. In several instances two, and in one or two cases three supposed species have been united in one. The genus *Physarum* has had its characters so modified that it now comprehends species that before were found in *Diderma*, *Didymium* and *Angioridium*; and one of its species, *Physarum nutans*, with its varieties, has been transferred to *Tilmadoche* and separated into two species.

The adoption of so many new names at once will necessarily be attended by some disadvantages, yet we think the advantages to be derived from the adoption of this new method of classification will more than compensate for the temporary inconvenience. One thing is quite evident to my mind, and that is, that the species may be more satisfactorily referred to their proper places by this system and by the description, given by Rostofinski than they possibly could be by the old system and descriptions.

The following is a list of the New York Myxogasters at present known. The names in the first or left hand column are those required by and arranged according to the new system; those in the second column are the old names, applied to such of the species as have before been reported and published as New York species:

<i>Present Names.</i>	<i>Former Names.</i>
<i>Physarum cinereum</i> Batsch.	<i>Didymium cinereum</i> Fr.
P. <i>contextum</i> Pers.	<i>Diderma flavidum</i> Pk.
P. <i>flavidum</i> Pk.	<i>Didymium flavidum</i> Pk.
P. <i>sinuosum</i> Bull.	<i>Angioridium sinuosum</i> Grev.
P. <i>polymorphum</i> Mont.	<i>Didymium connatum</i> Pk.
P. <i>albicans</i> Pk.	D. <i>subroseum</i> Pk.
P. <i>citrinellum</i> Pk.	<i>Diderma citrinum</i> Fr.
P. <i>luteolum</i> Pk.	
P. <i>inaequalis</i> Pk.	
P. <i>ornatum</i> Pk.	
P. <i>atrorubrum</i> Pk.	
P. <i>psittacinum</i> Dillon.	
P. <i>puleherryripes</i> Pk.	<i>Physarum puleherryripes</i> Pk.
<i>Tilmadoche nutans</i> Pers.	P. <i>nutans</i> Pers.
T. <i>mutabile</i> R.	

Present Names.

Craterium leucocephalum *Pers.*
 Leocarpus fragilis *Dicks.*
 Fuligo varians *Sommf.*
 F. ochracea *Pk.*
 Badhamia hyalina *Pers.*
 B. magna *Pk.*
 B. rubiginosa *Chev.*
 B. affinis *R.*
 Didymium farinaceum *Schrad.*
 D. squamulosum *A. & S.*
 D. microcarpum *Fr.*
 D. eximium *Pk.*
 D. angulatum *Pk.*
 Chondrioderma radiatum *L.*
 C. spumarioides *Fr.*
 C. crustaceum *Pk.*
 C. testaceum *Fr.*
 C. difforme *Pers.*
 C. Michellii *Lib.*
 Diachæa leucopoda *Bull.*
 D. splendens *Pk.*
 D. subsessilis *Pk.*
 Spumaria alba *Bull.*
 Stemonitis fusca *Roth.*
 S. ferruginea *Ehr.*
 S. herbatica *Pk.*
 Comatrichia æqualis *Pk.*
 C. typhina *Roth.*
 C. Friesiana *DeBy.*
 C. pulchella *Bab.*
 Lamproderma physaroides *A. & S.*
 L. violaceum *Fr.*
 L. arcyrioides *Sommf.*
 Amaurochæte atra *A. & S.*
 Tubulina cylindrica *Bull.*
 Clathroptychium rugulosum *Wallr.*
 Dictydium cernuum *Pers.*
 Cribraria intricata *Schrad.*
 C. purpurea *Schrad.*
 Reticularia lycoperdon *Bull.*
 Trichia fallax *Pers.*
 T. varia *Pers.*
 T. scabra *R.*
 T. chrysosperma *Bull.*
 T. reniformis *Pk.*
 T. inconspicua *R.*
 Hemiarcyria rubiformis *Pers.*
 H. clavata *Pers.*
 H. serpula *Scop.*

Former Names.

Craterium leucocephalum *Ditton.*
 Leocarpus vernicosus *Lk.*
 Æthaliium septieum *Fr.*
 Æ. ferrincola *Schw.*
 Licea ochracea *Pk.*
 Dictydium magnum *Pk.*
 Craterium obovatum *Pk.*
 Didymium farinaceum *Fr.*
 D. squamulosum *A. & S.*
 D. xanthopus *Fr.*
 Diderma umbilicatum *Pers.*
 D. farinaceum *Pk.*
 D. crustaceum *Pk.*
 D. Mariæ-Wilsoni *Clinton.*
 Diachæa elegans *Fr.*
 Spumaria alba *DC.*
 Stemonitis fusca *Roth.*
 S. ferruginea *Ehr.*
 S. typhoides *DC.*
 S. oblonga *Fr.*
 Licea cylindrica *Fr.*
 Dictydium umbilicatum *Schrad.*
 Cribraria intricate *Schrad.*
 C. purpurea *Schrad.*
 Reticularia umbrina *Fr.*
 Trichia varia *Pers.*
 T. chrysosperma *DC.*
 T. turbinata *With.*
 T. rubiformis *Pers.*
 T. pyriformis *Hoffm.*
 T. clavate *Pers.*
 T. serpula *Pers.*

<i>Present Names.</i>		<i>Former Names.</i>
<i>Areyria punicea Pers.</i>		<i>Areyria punicea Pers.</i>
A. <i>incarnata Pers.</i>		A. <i>incarnata Pers.</i>
A. <i>cinerea Bull.</i>	{	A. <i>cinerea Fl. Dan.</i>
A. <i>nutans Bull.</i>		A. <i>digitata Schw.</i>
A. <i>pomiformis Roth.</i>		A. <i>nutans Fr.</i>
<i>Lachnolobus globosus Schw.</i>		A. <i>globose Schw.</i>
<i>Oligonema flavida Pk.</i>		<i>Perichæna flavida Pk.</i>
O. <i>brevifila Pk.</i>		
<i>Perichæna caespitosa Pk.</i>		<i>Physarum caespitosum Pk.</i>
P. <i>corticalis Batsch.</i>		
P. <i>irregularis B. & C.</i>		
<i>Lycogala epidendrum Bux.</i>		<i>Lycogala epidendrum L.</i>
L. <i>flavo-fuscum Ehr.</i>		

Didymium oxalinum Pk. is probably only a form of *Physarum cinereum*, and is therefore omitted. *Dictydium microcarpum* received from Dr. Howe, is *Lamproderma physaroides* A. & S., and *Didymium simulans* Howe, is *Badhamia hyalina* Pers.

Of *Physarum sinuosum*, two varieties have occurred; one with the outer walls of the sporangium ochraceous, the other, with them nearly black.

Physarum citrinellum appears to be quite distinct from *Diderma citrinum*, to which it was referred. The following is a description of it:

Sporangia subglobose, double-walled, the outer wall crustaceous, yellow, the inner very delicate, whitish; stem very short, reddish; capillitium whitish or slightly tinged with yellow, its knots numerous, large; spores blackish in the mass, globose, minutely rough, .0004'-.0005 in diameter.

Mosses. Catskill Mountains.

The stem is so short that the sporangia appear sessile. The double-wall of the sporangium prevents the reference of the species to *Physarum Schuermacheri*.

FULIGO VARIANS *Sommf.*

The widely variant forms that are brought together under this name by Dr. Rostafinski, present to the eye such diverse appearances, that it is difficult to believe that they should all be united. The forms with a floccose æthallium like the old *Æ. septicum*, *Æ. vaporarium* and *Æ. ferrin-coli* are readily united, but those with a crustaceous æthallium would appear rather to constitute another species, while the form with a naked gyrose surface seems still more worthy of specific distinction. Aside from its external peculiarities, its internal structure strengthens the idea of its specific validity. Nevertheless, it must be admitted that the spores are so nearly alike in all the forms, that they do not confirm the differences exhibited externally. I am of the opinion, however, that the last-mentioned form will yet be separated from the others, and also that *Fuligo ochracea* does, and will equally merit specific distinction, and for this reason I have not united it with the others. *Æthallium geophilum* Pk. is not an *Æthallium*, nor even a *Myxogaster*. It is probably *Hyphelia terrestris* Fr.

BADHAMIA MAGNA Pk. (*Dictydium magnum* Pk.).

Perhaps some may regard this as a form of the very variable *Badhamia utricularis*. It approaches *B. utricularis* v. *Schimperiana*, but differs clearly in its larger size and globose sporangia with reticulately corrugated walls.

DIDYMIUM MICROCARPUM *Fr.*

D. nigripes Fr. and *D. santhopus* Fr. have been united under this name. To an observer of their external characters they appear quite distinct. Both forms occur with us, the former on fallen leaves, the latter on living *Sphagnum*.

CHONDRIODERMA TESTACEUM *Fr.*

A form of this species with the outer walls of the sporangium, a clear white with no tinge of pink, is quite common.

CHONDRIODERMA SPUMAROIDES *Fr.*

Our specimens (*Diderma farinaceum* Pk.) abound in lime granules and belong to the variety *carcerina*.

STEMONITIS HERBATICA *Pk.*

Though resembling *S. ferruginea* in color, this species is easily distinguished from it by the comparatively shorter stem, larger meshes of the capillitium and decidedly larger spores, which frequently attain a diameter of .0004 inch, nearly twice the usual dimensions of the spores of *S. ferruginea*. There is a small form of *S. ferruginea*, which is nearly equal to *S. herbatica* in size, but it is true to the characters of its own species, and would not be confounded with *S. herbatica* after an examination of its spores.

HEMIARCYRIA CLAVATA *Pers.*

The threads of the capillitium in our specimens are much larger than is indicated in the description of the species. Their diameter is about equal to the diameter of the spores, and about twice the diameter ascribed in the description.

SPHEROPSIS MALORUM *Berk.*

This sometimes attacks apples while yet hanging on the tree.

PESTALOZZIA PECKII *Clinton.*

According to specimens received from Europe, this is not distinct from *P. monochaeta* Desm.

CONIOTHECIUM TORULOIDEUM *B. & C.*

The fungus thus referred to in the Twenty-third Report, and more recently regarded at different times as *Torula stilbospora* Cd. and *Trimmatostroma Salicis* Cd. has recently been published as *Trimmatostroma Americana* Thumen. We hope it has finally found a permanent resting place under this name. It forms numerous small black dusty dots on dead branches of willows, and stains or crocks the fingers handling it.

SEPTONEMA BICOLOR *Pk.*

Owing to the delay in the issue of the Twenty-eighth Report, this name is antedated by *Sporideomium* Peziza, C. & E.

BACTRIDIVM FLAVUM *K.*

The specimens formerly referred to this species fall more properly under the more recent species *Bactridium Ellisii* Berk.

PUCCINIA MENTHÆ *Pers.*

On *Pycnanthemum incanum*. Bethlehem.

PUCCINIA SPRETA *Pk.*

Leaves of *Mitella nuda*. Buffalo. Clinton. Leaves of *Mitella diphylla*. Griffins.

PUCCINIA STRIOLA *Lk.*

Leaves of *Carex irrigua*. Summit.

USTILAGO URCEOLORUM *Tul.*

Fruit of *Carex irrigua*. Mount Marey. The spores in these specimens are large and much less angular and unequal than usual.

STILBUM GIGANTEUM *Pk.*

I find this associated with *Patellaria leptosperma* *Pk.* in such a way as to suggest the probability, at least, that it is a form of the latter species.

HELVELLA SULCATA *Afz.*

The prominent character in this species, as indicated by the name, is the sulcate stem. The furrows are very deep, and extend, without interruption, the entire length of the stem. The whole stem, as shown by a cross-section, is made up of the costæ intervening between these furrows. I do not find the stem "stuffed," as required by the description in *Syst. Myc.* Vol. ii, p. 15. The pileus is generally darker than that of *H. crispa*.

Our New York species of *Helvella* readily fall into three groups depending on the character of the stem. The following tabular arrangement will exhibit this feature, and aid in tracing the species.

New York Species of Helvella.

Stem even, stout, three lines or more in diameter.

Pileus inflated, gyrose-lobate.

Spores elliptical..... *H. esculenta* *Pers.*

Spores globose..... *H. sphaerospora* *Pk.*

Pileus deflexed, lobate, spores elliptical..... *H. Infula* *Sclaff.*

Stem costate-sulcate, stout.

Pileus white..... *H. crispa* *Fr.*

Pileus colored..... *H. sulcata* *Afz.*

Stem even, slender, less than two lines thick.

Stem glabrous..... *H. gracilis* *Pk.*

Stem velvety-pruinose..... *H. elastica* *Bull.*

The first and second species in the table belong to the more recent genus *Gyromitra*. The last one, *H. elastica*, is sometimes nearly black, and is, perhaps, then *H. atra*. These two, according to the descriptions, have the pileus free, but in our plant it is sometimes adnate to the stem. *H. lacunosa* and *H. ephippium* have not yet occurred with us.

CENANGIUM CERASI *Fr.*

This is not limited to cherry in its habitat, but occurs also on birch.

XYLARIA DIGITATA *Grev.*

One of our most common *Xylarias* agrees with the characters ascribed to this species; except in the size of the spores. These are described as .0007–.0008 long. In our plant they are about .0005 long. Because of its short spores, it has sometimes been referred to *X. Hypoxylon*; but in this species the stem should be villose, a character which our plant does not exhibit. The difference between its spores and those of *X. digitata* is so marked and so constant that it should not be disregarded. I therefore propose to distinguish

our plant as a variety, giving it the name *X. digitata* var. *Americana*. It is frequent on decaying wood and old prostrate, mossy trunks.

The following tabular arrangement will exhibit the principal distinguishing features of the New York species thus far reported :

New York Species of Xylaria.

Club everywhere fertile, obtuse.	
Spores .0005'-0.0012' long.....	<i>X. polymorpha</i> Grev.
Spores .0004' long.....	<i>X. corniformis</i> Fr.
Club sterile above, subacute or attenuated.	
Sterile apex short, subacute.	
Club irregular, subovate, large.....	<i>X. grandis</i> Pk.
Club regular, subcylindrical.....	<i>X. acuta</i> Pk.
Sterile apex acuminate or attenuated.	
Stem short, villose.	<i>X. Hypoxylon</i> Grev.
Stem not villose.	
Perithecia numerous, little prominent.	
Stems generally connate at the base or digitately branched.....	<i>X. digitata</i> Grev.
Stems always simple.....	<i>X. graminicola</i> Ger.
Perithecia few, very prominent.....	<i>X. filiformis</i> A. & S.

In *X. acuta* the short, sterile apex sometimes appears like a short mucronate point, and sometimes it is quite obsolete, so that the plant might be mistaken for *X. coniformis*, but for its larger spores. Its thicker club, simpler habit, and peculiar apex, separate it from *X. digitata*.

X. graminicola might easily be taken for a simple form of *X. digitata* v. *Americana*. *X. Hypoxylon* is extremely rare with us.

SPHÆRIA EXIMIA Pk.

Owing to the delay in the issue of the Twenty-eighth Report, the name of this species was antedated by *S. amphiornis* Ellis.

SPHÆRIA MORBOSA Schw.

This deleterious fungus was found on branches of the wild black cherry, *Prunus serotina*, in Keene Valley, Essex county. It is now known to occur on *Prunus domestica*, *P. Americana*, *P. Cerasus*, *P. Virginiana*, *P. Pennsylvanica* and *P. serotina*. Two of these are plum-trees—one introduced, the other native—and the remaining four are cherry trees, of which the three last are indigenous.

In the preceding pages, when no name is added to the station or stations, the plant has been found therein by the writer. Dates signify the time when the specimens were collected, and therefore indicate, to some extent, the time of the occurrence of the plant.

Grateful acknowledgements are rendered to those Botanists who have kindly aided me by contributions of specimens. Their names appear in the preceding pages.

Respectfully submitted,

CHARLES H. PECK.

ALBANY, January 4, 1878.

NOTES ON SOME SECTIONS OF TRILOBITES FROM THE TRENTON LIMESTONE.*

By C. D. WALCOTT.

In a former article,† the writer expressed the view that the perfect state of preservation of the delicate branchial appendages and ventral membrane of the trilobite, precluded the idea of the destruction of anything of a stronger than fleshy, swimming lobes attached to the axial appendages. Within a month after the above was written, a section was obtained, showing that not only was the axial appendage articulated to the ventral surface, but, also, that it was a jointed appendage. Six months later, the branchial appendages were found. Although the structure of the Trilobite, in detail, is not yet determined, evidence of great interest has been obtained. Numerous sections of *Culymene senaria* show axial appendages with three joints. The coxa or basal (?) joint is about as broad at the upper end as long; it has a slight projection upon its upper, outer side for the attachment of the branchial arm. In a longitudinal section of the Trilobite, it is articulated to the ventral surface by a narrow process at or near its posterior margin. Transverse sections show the articulation to be at or near the center. The second joint is broadest at the base, and tapers toward the lower end, to which the third joint is attached. The third joint, in all appendages of this species seen (seventy-seven in number), terminates in a round, blunt end. As yet, no transverse sections showing more than one joint have been obtained. In transverse sections of *Cerurus pleurexarthemus*, the fifth joint terminates in a short claw.‡ There may be six joints in the leg. In the sections five only can be distinguished. Longitudinal sections of this species show a few appendages terminating at the third joint, as in *Culymene senaria*. The finding of good transverse sections of the latter species will probably prove that the legs had five or six joints, with a terminal claw. Longitudinal sections cannot show the number of joints, as the leg extends obliquely downward, and only an oblique section of two or three joints is obtained. Attached to the basal (?) joint of the leg there is a slender, jointed arm of two, and probably three joints. Portions of pinnulæ are attached to the terminal joint. Whether they are branchial tubes cannot be satisfactorily determined from the section. In other sections, rows of pinnulæ are shown, which are undoubtedly branchial tubes. From the character of the remaining portion of the respiratory apparatus, they must have been attached to the arm. It is also quite probable that a branchia was attached to the basal joint of the arm. It may be that its occurrence in this position, in the section, is owing to the displacement of one of the branchia attached to the thoracic cavity. These branchia are attached above the basal joint of the leg. The branchia in *Culymene senaria* projects out a short distance, and then bifurcates, sending two spirals nearly to the edge of the dorsal shell. In some sections the base appears to be a portion of the ribbon or band forming the spiral,

* This and the following papers, by C. D. Walcott, with the exception of the note on the Trilobite's legs, from Cincinnati, O., and the two figures of the same, Plate I, Figure —, were published and distributed, in pamphlet form, September 20th, 1877, in advance of the present Report.

† Preliminary Notice of the Discovery of Natatory and Branchial Appendages of Trilobites, and Additional Evidence upon the same. Twenty-eighth Annual Report New York State Museum of Natural History, December, 1876.

‡ As yet seen only beneath the central segments of the thorax. As in this species the axial appendage occurs upon each segment of the pygidium, and its first, second and third joints are similar to those beneath the thorax, it is probable that there is little change from the modified appendages beneath the head to the posterior segment of the pygidium.

straightened out, while in others it is a closely-coiled spiral. At the bifurcation the outer spiral springs from the base, which continues on to form the inner spiral. The spirals are most ventricase at the center, tapering toward both extremities. Their curvature follows that of the dorsal shell. The ribbon or band forming the spiral is slightly flattened and somewhat loosely coiled. In several sections the spiral has been pulled out, so that the plane of the section passes through it, as in Figure 5, c Plate I. Generally they present the appearance of Figure 5, f Plate I, where the section appears to pass through the spiral in its normal condition. A section cut obliquely from the posterior margin of the glabella to below a line with the eyes, in part, and between the dorsal shell and hypostoma, shows one side of four pair of setiferous appendages. They appear to consist of a short projection from the mass of calcspar filling the cavity of the glabella, to which a short joint is articulated. From the best preserved one, eighteen setæ radiate from the side and end of the outer joint. The setæ average two m. m. in length. A transverse section of the head of an *Acidaspis Trentonensis*, from near the posterior margin across the posterior end of the hypostoma, gives an opposite section of the setiferous appendage. It is essentially the same as those in *Calymene*. It is situated beneath the dorsal shell, on a line with the branchial appendages of the thorax, and is a modified continuation of the branchial series of appendages.* A narrow layer of calcspar connects the visceral cavity with the doobline of the head. A transverse section of the head of a *Calymene*, cut so as to cross the hypostoma just within the posterior end, shows the upper half of the space beneath the glabella to be filled with calcspar. This space is the continuation of the visceral cavity of the thorax. From the lower lateral margin of each side, a jointed appendage extends outward and downward. The basal joint is large—twice as long as broad; from the lower slightly concave surface a slender joint projects, which is followed by one, and, when the appendage is entire, by three or four joints. A narrow band of spar unites the upper visceral space with the spar filling the concavity of the hypostoma. Between the upper pair of appendages and the glabella three pair of appendages project. Their basal joint is slender; and, in two sections, closely resemble the maxillary joint of the leg of the *Eurypteris*, modified in form, but undoubtedly subservient to the same use as a part of the mouth. Two sections show three long, slender joints, but not a terminal one in position. In three detached joints the terminal one is small and sharp-pointed. In one beautiful transparent section the observer looks into what appears to be the opening of the mouth. The basal joints of the manducatory legs have their upper inner margins truncated, and are slightly convex. Four on each side; they form an elongate opening above the hypostoma, the upper end of which is closed by the approximation of the upper margins of the broad coxal joints of the upper pair of appendages.†

Sections of *Asophus platycephalus* furnish evidence that it has axial appendages of essentially the same structure as those of *Calymene* and *Cerurus*, as the basal and second joints in the section are the same as seen in those genera, and the basal joint of the leg is attached in the same manner to the body. The visceral cavity is attached to the shallow dorsal groove. From the above described sections, and others not mentioned, the following conclusions upon the structure of the Trilobite may be given, as based upon the evidence now at

* These appendages are probably attached to the manducatory legs. The thoracic spiral of our striae are absent, or else simple projections. Sections, partially confirmatory of this, are at hand.

† Upper appendage is here used instead of posterior appendage, in the sense that the mouth, in this species, was situated between the ventral surface of the visceral cavity and the hypostoma, and opened posteriorly instead of directly downward. This would necessitate the curving of the alimentary canal beneath the glabella to pass to the mouth.

hand. Future discoveries may, and undoubtedly will, add to and change them somewhat, these notes being intended to show the progress made up to the present date, and not as a final publication.

First. The Trilobite had a thin, ventral membrane beneath the visceral cavity, strengthened by arches, which supported the appendages beneath. The membrane extended outward from the main visceral cavity, and joined the edge of the doubline of the head, thoracic segments and pygidium, somewhat as the sternum of *SIMULUS* is connected to the margins of its shell by a membranous crust.

Second. Attached to the ventral surface, on a line with the outer edges of the alimentary canal, there is a row of articulated appendages on each side—the leg consisting of five or more joints, the terminal joint being provided with a claw, and the basal (?) joint with a point of attachment for a jointed arm.

Third. The jointed appendage attached to the basal joint of the leg is homologous with the epipodite of modern crustaceans. (This statement is made with some reserve, as the evidence is not positive. The basal joint, as seen in all the sections showing it distinctly, is large and articulated to the ventral surface. Should this basal joint ultimately prove to be formed of two joints—too closely segmented to be separated in the present sections, and the arm attached to the second joint—the homology will be with the expodite. And, as it is a gill-bearing organ, it may be homologized with that organ in *Mysis*.)

Fourth. The respiratory apparatus consists of a gill-bearing appendage attached to the thoracic leg and a bifid spiral gill attached to the side of the thoracic cavity. The setiferous appendages attached to, or above the manducatory legs are modified thoracic branchiae.

Fifth. The mouth is posterior to the hypostoma, and consists of the four pairs of manducatory jaws, formed by the basal joints of the smaller appendages and the larger pair of the posterior pair of appendages. (An oblique section of what may prove to be the swimming-joint was found in a section of the same species of Trilobite, from which the parts of the mouth have been obtained. It has three slender joints attached. A small spine projects from one towards the terminal joint. It was probably attached to one of the posterior manducatory legs as a portion of the swimming apparatus of the Trilobite.)

Conclusion. Admitting the third conclusion to be correct, in regard to the attachment of the jointed arm to the basal joint, we can homologize the leg and epipodite with that of the thoracic leg of the larval lobster. Its relation to *Mysis*, in event of its being the expodite, is mentioned in the third conclusion. The homology between the parts about the mouth of the Trilobite and the same organs in the Eurypterida and Zyphasera is very direct, and relates the families closely. In view of these relations, the following arrangement is made. Taking Prof. Henry Woodward's classification of Zyphasera and Eurypterida under Gnathopoda, and adding the Trilobite, we have:

Class—CRUSTACEA.

Sub-Class—GNATHOPODA.

Legion—MEROSTOMATA.

Order 1—Zyphosera.

“ 2—Eurypterida.

“ 3—Trilobita.

NOTE UPON TRILOBITES' LEGS FROM THE HUDSON RIVER GROUP AT CINCINNATI, OHIO.

Some months since, I received from Mr. S. A. Miller, of Cincinnati, a small slab of stone, upon which there is a slender six-jointed leg of some crustacean, and fragments of three other legs. More recently, Dr. C. A. Miller has kindly loaned me a slab, obtained at the same locality, which has the remains of ten legs upon it. The legs are scattered about among fragments of Trilobites of the genera ASOPHUS, CALYMENE, ACIDASPIS, and TRINUCLEOUS, and remains of brachiopods and bryozoans. The test forming the joints is thin, and differs from the test of the Trilobite in being crushed without breaking, and in a generally more membranous appearance. Four of the legs have six joints each. Figures 6 and 7, Plate I, show two of these legs enlarged to two diameters. The joints are somewhat flattened. With the exception of the terminal one, each joint is slightly contracted at its lower end, and then expands, forming the articulation for the succeeding joint. The only crustacean known to have existed at the time of the deposition of the rocks of this group, that could have had such legs, is the *Trilobite*. Judging from the size of the legs, they must have belonged to an individual of the genus ASOPHUS or CALYMENE. To the legs figured by the late Prof. E. Billings,* in a specimen of *Asophus platycephalus*, they have a strong resemblance. A discussion of the views of various authors upon the structure and relations of the Trilobite is reserved for a future article, in which, also, the evidence upon the structure of the mouth and branchiæ of the Trilobite will be given more fully than in the preceding article.

* *Quart Journ Geol. Soc.*, Vol. xxvi, pl. xxvi, Nov. 1870.

PLATE 1.

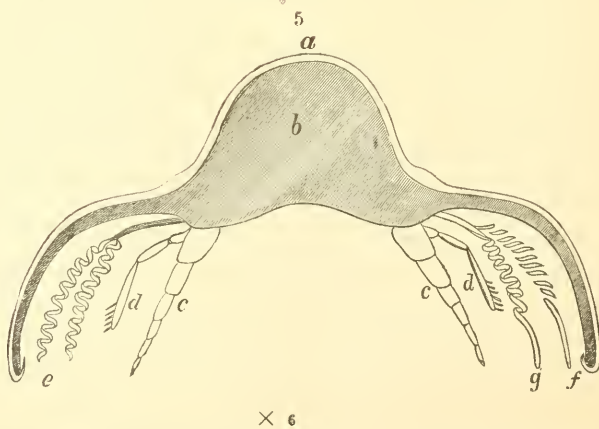
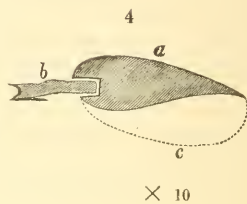
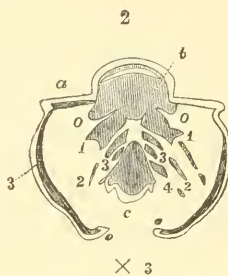
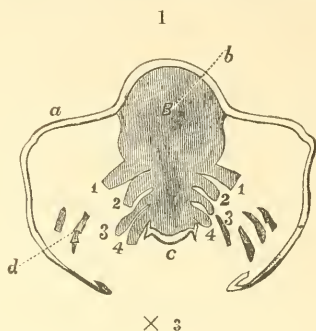


PLATE I.—DESCRIPTION OF FIGURES.

FIG. 1. Transverse section of the head of *Calymene senaria*.*

- a* Dorsal shell.
- b* Visceral cavity.
- c* Hypostoma.
- d* Terminal joints of manducatory leg.
- 1 Coxa of posterior manducatory leg.
- 2, 3, 4, Manducatory appendages or legs.

FIG. 2. Same as Fig. 1.

- e* Membraneous crust connecting visceral cavity and doobline.
- o* Base of fourth pair of manducatory legs.

FIG. 3. Section of the leg or axial appendages of *Cerærus plurexanthemus*.

- 1, 2, 3, 4. Joints of leg.
- a* Terminal claw.
- b* Edge of section.

FIG. 4. Supposed swimming foot or terminal joint of posterior manducatory leg.

- a* Terminal joint.
- b* Three small joints and spine.
- c* Restored outline.

FIG. 5. Transverse section of the thorax of *Calymene senaria* partially restored.

- a* Dorsal shell.
- b* Visceral cavity.
- c* Legs restored.
- d* Epipodite.
- e* Spiral gills, as seen in detached condition in other sections.
- f* Actual section of spiral gill.
- g* Same restored.
- o* Continuation of visceral cavity to edge of dorsal shell, with the exception of portions of Fig. 5 restored; the figures are each a copy of a section.

FIGS. 6 and 7. Legs of six joints, each enlarged to two diameters. From Dr. C. A. Miller, of Cincinnati, O.

* This section passes directly down through the head, so as to cut the hypostoma *c* just within its posterior margin.

NOTE UPON THE EGGS OF THE TRILOBITE.

By C. D. WALCOTT.

Prof. Joachim Barrande gives a description of the supposed eggs of the Trilobite, in the first volume of the Palæontology of Bohemia.* He describes them as having the form of black spherules; some two-thirds, and others four or six millimetres in diameter. They occur mingled in the same beds with fragments of Trilobites, and correspond in size with the first stages of development of the species of Trilobites with which they are associated. In the supplement to Volume I, 1874, illustrations are given of groups of eggs, or ova, which were found on the surface of the rock. In one instance, a group of cylindroid-shaped ova was found within the glabella of a Trilobite—*Barrandia crassa*. Plate II, Fig. 6. In the description of the plate, the author states that he considers their occurrence in this position purely accidental, and that they have the appearance of the small bodies named *Parca decipiens* Flem., which have been considered as the eggs of Gasteropods. The small bodies, forming the clusters or groups, vary in form from ovoid, cylindroid, to discoid—retaining the same form in each individual group. The mode of occurrence of the groups of ova indicates that they were deposited by the animal in the place and position found. Barrande states that they are probably the ova of some crustacean.

The spheroidal bodies first mentioned are the only ones that have been considered as the ova of the Trilobite, the proof being their occurrence with the fragments of Trilobites, and their correspondence in size with embryo forms of the species with which they are associated.

When cutting sections through the body of a Trilobite, *Cerærus pleurexanthemus*, I noticed, on an opaque, central, longitudinal section, numerous dark, round and oblong, minute spots on the light-colored back-ground of calespar, which filled the visceral cavity between the dorsal shell, hypostoma and ventral membrane. Upon cutting off a section, and rendering it transparent, I saw that the dark spots were the ova of the Trilobite. Subsequently several sections were obtained, showing the ova in various positions within the visceral cavity. In section Number 1, the Trilobite rests on its back, with the head and three anterior segments of the thorax curving upward. The hypostoma is in place, separated, at the posterior end, from the dorsal shell of the head by a distance of four mm. A thin membrane is attached to the posterior margin; it passes one-half the distance toward the dorsal shell, where it joins the ventral membrane, which extends beneath the thorax five mm., terminating at the third segment. The remaining portion of the visceral cavity having been destroyed, the rock fills the space to the dorsal shell. The ventral membrane is corrugated or folded beneath each segment. The space between the dorsal shell and the ventral membrane, two mm. wide, is filled with the ova, which, also, has pressed into the cavity of the head, between the dorsal shell and the hypostoma, filling about one-fourth of it. Over two hundred eggs are to be seen in this section. The transverse section of an egg is round, averaging one-fourth of a mm. in diameter. The longitudinal section is an oblong-oval or cylindroid one, half of a mm. in diameter. Those cut obliquely show various intermediate forms. A second section of the same Trilobite, cut on a line with the pleural lobes, shows

* Systeme Silurien du Centre de la Bohême. Par Joachim Barrande. 1e. Partie. Recherches Paléontologiques, vol. 1; Crustacés; Trilobites. 1852.

over fifty eggs scattered more loosely in the spar. In a longitudinal section of another individual, a cluster of eggs, closely agglomerated, occurs within the visceral cavity, between the eight posterior segments of the thorax and the ventral membrane. Three transverse sections, from different individuals, show the ova within the visceral cavity. In one, cut just posterior to the hypostoma, the ova are near the dorsal shell. The other two are cut across the thorax. The ova are in the spar which fills the axial appendages and visceral cavity. They seem to be scattered, as if the organic matter was replaced by the spar—was in such a condition as to permit of their passing from the visceral cavity down into the cavities of the axial appendages.

The method of aggregation of the ova, and the close resemblance in form of the individual bodies forming the clusters, as figured by Barrande,* to the ova found within the Trilobites, indicates that both are the ova of the Trilobite. If the above view is sustained, then the manner of the oviposition of the Trilobite is different from what has hitherto been supposed, as the clusters of ova must have been deposited something as the *Argulus* deposits its eggs, and not dropped into the water, as by *Simulus* or *Branchipus*. The relation of the ova to the position they occupied in the living animal will be spoken of in a future article, as most of the sections thus far obtained show that they have been displaced, and forced into the various positions in which they are found.

* Supplement, Pl. 11, Fig. 6. Pl. 18, Figs. 30, 32. Pl. 33, Figs. 21, 23.

DESCRIPTIONS OF NEW SPECIES OF FOSSILS FROM THE CHAZY AND TRENTON LIMESTONES.*

By C. D. WALCOTT.

ARIONELLUS—BARRANDE, 1846.

ARIONELLUS PUSTULATUS *n. sp.*

Glabella very convex ; separated from the fixed cheeks by a strong dorsal furrow ; short glabellar furrows outline a frontal lobe at the anterior third ; a lateral lobe is indicated, on each side, by a short depression or furrow parallel to the longitudinal axis of the glabella. Fixed cheeks depressed beneath the level of the glabella. The strong dorsal furrow, extending all around in front of the glabella, and the rapidly sloping outer margin gives them a prominent rounded, almost tumid appearance. Occipital segment broad, depressed, separated from the glabella by a narrow furrow. One segment of the thorax is preserved in one specimen. It is strongly arched on the axle lobe ; pleuræ with an elevated posterior ridge, and depressed anterior margin. Surface pustulose or finely tuberculated. Eyes, movable cheeks and pygidium unknown.

Formation and locality—Chazy Limestone, Chazy, N. Y.

CERAURUS—GREEN, 1832.

CERAURUS RARUS *n. sp.*

Glabella subtrubinate, convex ; broadly rounded in front, separated from the fixed cheeks by strong dorsal furrows ; frontal lobe large, occupying the anterior half of the glabella ; middle and posterior lobes small, diminishing regularly in size toward the occipital segment ; glabellar furrows deeply impressed. Occipital segment rounded, separated by a well defined furrow from the glabella. Fixed cheeks crushed. Surface ; fixed cheeks and frontal lobe of glabella postulose ; posterior or glabellar lobes finely granulated.

Formation and locality—Trenton Limestone, Beloit, Wisconsin.

ENCRINURUS—EMMRICH, 1844.

ENCRINURUS TRENTONENSIS *n. sp.*

Pygidium triangular, convex ; length and breadth about equal ; axial lobe rounding, tapering toward and terminating within the posterior margin ; marked by twenty-three rings, beyond which are several, too indistinct to be counted ; the first anterior ring has a node at its center ; then, in order, the third, sixth, tenth, fourteenth, eighteenth and twenty-second have a similar node at the center. Lateral lobes slope rapidly to the margin ; each has nine elevated costæ running obliquely backward to the margin.

Formation and locality—Trenton Limestone, Clifton, Grant Co., Wisconsin, and two miles above Dunlith, Ill., north of State Line monument.

* Cited in Miller's Catalogue of Palæozoic Fossils, as from the Twenty-ninth Regents' Report on the State Cabinet of Natural History.

ENCINURUS VARICOSTATUS *n. sp.*

Pygidium subtriangular, convex; length and breadth about equal; anterior lateral angles truncated so that the lateral margins commence opposite the center of the pygidium; axial lobe not very prominent; crossed by about sixteen smooth rings; the anchylosing of the posterior rings renders it difficult to determine the exact number. The lateral lobes are marked by six broad, distinct, costæ—the posterior pair unite back of the posterior termination of the axial lobe.

Formation and locality.—Trenton Limestone, Mineral Point, Beloit, and north of Janesville, Wisconsin.

ACIDASPIS—MURCHISON, 1839.**ACIDASPIS PARVULA**, *n. sp.*

Body small, broadly elliptical, somewhat convex. Head semicircular in outline, lateral angles terminating in slender spines. Glabella oblong; owing to the granulose character of the surface, and the slight glabellar furrows, the lateral lobes and cheeks are scarcely defined. Eyes small, prominent. Thorax strongly trilobate; axial lobe two-thirds the width of the pleural; segments rounded on the axial lobe; each one has four prominent tubercles upon the upper surface; two each side of the center; segments of the pleural lobes consist of a posterior, rounded, elevated ridge, which has four strong tubercles upon it, and a depressed anterior portion; upon the free pleuvæ or spinous extension of the elevated ridge of the pleural segment, two smaller tubercles occur.

Pygidium, too imperfect for description; its strongly granulose surface, and the prolongation of the lateral segments into long spines, are the only characters clearly defined.

Entire surface granulose, which, with the larger granules or tubercles upon the head, the twelve rows of tubercles upon the thorax, and the continuation of the central rows on the pygidium, gives this species a strikingly peculiar appearance that distinguishes it from the associated *Acidaspis Trentonensis*, and all described species of the genus.

Formation and locality.—Trenton Limestone, Trenton Falls, N. Y.

DALMANITES—BARRANDE, 1852.**DALMANITES INTERMEDIUS**, *n. sp.*

General form narrow, ovate, moderately convex. Head suberesentiform, with a narrow margin, which is slightly produced in front of the glabella; posterior lateral angles terminating in short spines. Frontal lobe of glabella subrhombic, slightly convex; anterior lobes subtrigonal, separated from the frontal and middle lobes by well-defined glabellar furrows, which penetrate from each side one-third the distance across the glabella; middle lobes subrectangular, shorter and smaller than the anterior lobes; posterior pair as rudimentary tubercles upon the anterior margin of the occipital furrow. Occipital segment comparatively broad and elevated posteriorly above the highest point of the glabella, narrows toward the dorsal furrows, angular, and abruptly turned downward, at the posterior margin. Occipital furrow regularly concave, extending on the cheeks as a marginal furrow to the lateral rim. Eyes prominent, palpebral lobe depressed, except at the outer margin, which forms a rim around the top of the eye.

Thorax tapers rapidly from about the center towards the pygidium; axial

lobe convex, about two-thirds the width of the lateral lobes; lateral lobes strongly geniculate; segments nearly transverse on the axial lobe; pleural grooves strongly marked. Pygidium subtriangular, strongly convex.* Axial lobe very prominent; tapers from the anterior margin to about half the width at its posterior termination; lateral lobes slope rapidly to the margin; fourteen segments are indicated on the axial, and eight on each of the lateral lobes; those on the lateral lobes extend nearly to the margin, and have slight pleural grooves on the anterior three.

Glabella slightly pustulose; surface of thorax and pygidium apparently smooth.

This species is allied to *D. callicephalus* Hall, *D. breviceps* Hall, and *D. Carleyi* Meek. From the first it differs in the general outline—posterior lateral spines of the head, shape of the glabellar lobes, smaller size of the pygidium in proportion to the head, distinct character of the lateral segments of the pygidium, and the absence of pleural grooves upon those segments, with the exception of the first three. The difference in the glabella readily distinguishes it from *D. breviceps*. The more rhombic frontal lobe, rudimentary posterior lobes of the glabella, larger palpebral lobes, greater proximity of the eyes to the glabella, separate it from *D. Carleyi*; and, if the pygidium referred to the species, by its author, is the one belonging to it, the differences with *D. Carleyi* are still greater.

Formation and locality.—Trenton Limestone. Two miles north of Dunlith, Ill.; Clifton, Grant county, and Plattsville, Wisconsin.

ILLÆNUS — DALMAN, 1826.

ILLÆNUS INDETERMINATUS *n. sp.*

General form, elongate elliptical, strongly convex. Head convex; broadly rounded in front; length two-thirds the width. Glabella moderately convex, curves gently from the posterior margin to the anterior portion, where it abruptly curves downward. The dorsal furrow is marked at its central portion, by a strong oblong depression, anterior to a line with the eyes, and one-quarter the distance between the eyes, from the palpebral lobe; the anterior extension extends obliquely forward toward the lateral margin terminating in a rounded pit, which has a tubercle at the center; posteriorly the furrow is strongly defined, it passes obliquely backward nearly to the posterior margin, where it curves and running a short distance, cuts the margin on a line with outer margin of the eye.† Eyes broken away with the movable cheeks; palpebral lobes indicate that they were of medium size, situated a short distance from the posterior margin. Facial sutures terminating on the posterior margin outside a line with the outer margin of the eye; anteriorly terminating on a line with it.

Thorax uniformly arched, not trilobed; nine segments only can be counted; the crushing together of the segments may have forced one beneath the head.

Pygidium parabolic, very convex, almost tumid along the center; width a little greater than the length, broadly and uniformly rounded anteriorly; anterior lateral angles depressed to admit of their passing beneath the posterior segment of the thorax, when the animal was enrolled.

Surface; anterior margin of head with a band of strong lamellose striæ,

* Anterior margin a little more than one-half as wide as the posterior margin of the head.

† The general course of the dorsal furrow, from the anterior termination, to the posterior margin, is similar to that of the facial suture in the genus *Asaphus*.

parallel to the margin: the posterior margin has a narrower and less well-defined band of striæ; remaining portion of head minutely punctate. Thorax minutely punctate; striate on the outer pleural portion on each side. Pygidium marked by strong lamellose striæ, which have their origin near the anterior lateral angles and diverge in different directions over the surface, running subparallel to each other around the posterior side; a row of punctures occur between the striæ near the margin; surface otherwise finely punctate. The removal of the test shows that the shell was very thin, and covered on the inside with minute and coarse punctures or shallow depression. The lower surface of the doobline is striate.

This species is allied to the group of *Illæni*, described by Prof. Hall, from the Niagara group of Wisconsin and Illinois; especially to the species *Illænus insignis* and *I. annatus*. To *ILLÆNUS TRENTONENSIS*, it has many points in common. As far as I can judge from the figures and descriptions, it is a distinct species.

Dimensions of specimens described :

Total length.....	6 $\frac{3}{4}$ (?) inches.
Length of head.....	2 ..
Breadth of head.....	3 ..
Distance between the eyes.....	2 $\frac{1}{2}$..
Length of Thorax	2 (?) ..
Length of Pygidium	2 $\frac{3}{4}$..
Breadth of Pygidium.....	4 ..

Formation and locality—Black River Limestone, Buck's Quarry, Russia, Herkimer Co., N. Y.; Trenton Limestone, Plattsville, Wisconsin.

ILLÆNUS MILLERI BILLINGS.

Illænus Milleri occurs in the same beds with *I. indeterminatus*, both in New York and Wisconsin. It also occurs in the upper beds of the Trenton Limestone at Trenton Falls. Perfect specimens shows ten thoracic segments. The original type specimens had but nine; one was probably pushed beneath the head, as in all other particulars, the species agrees with that from Canada, where it occurs in the Black River and Trenton Limestones.

ASAPHUS HOMALONOTOIDES n. sp.

Glabella elongate, pointed in front; broadest at the anterior third. The dorsal furrows and occipital furrow give a subquadrate form to the central portion of the glabella similar to that in species of the genus *Homalonotus*. The occipital segment is defined back of the glabella, by a slight depression which is more strongly marked back of the eyes. A pair of glabellar furrows are indicated by shallow depressions between the eyes.

Pygidia, associated with specimens of the above glabella, have a subtriangular outline, prominent axial lobe, marked convexity, anterior margin with a distinct pleural groove, and a shallow depression between the external margin and the outline pleural lobes. The subtriangular form strongly marked axial lobe, relates the pygidia to the equally distinct associated glabella.

A large pygidium referable to this species is three inches in length, by three and one-half in breadth, at the anterior margin.

Formation and locality—Trenton Limestone, two miles above Dunlith, Ill., north of State Line monument.

NOTES ON PHLOGOPYTE.

By R. FRITZ-GAERTNER, PH. D.

The mineralogical characteristics of Phlogopyte have been repeatedly described by Breithaupt, Dana, Zirkel, and many other authors.

In bringing this short notice before the public, I would state that the following lines will treat mainly of phlogopyte of the State of New York, with particular reference to phlogopyte of Warwick, Orange county, and Pope's Mills, St. Lawrence county.

Examples of phlogopyte were also examined and compared, which were derived from Oxbow and Antwerp, Jefferson county; O'Neil Mine, Monroe county; Edenville, Orange county, and Edwards, Somerville, Natural Dam, Gouverneur, St. Lawrence county.

The specimens which the writer examined belong to the mineralogical collection of New York State, and are exhibited in the Museum at Albany.

The main object of these notes is to give some contribution to our knowledge of the microscopical structure of phlogopyte; but as the microscopical habitus is closely allied to some microscopical features of this mineral, it will be necessary to treat, also, of its general characteristics.

Crystallographical system.—Phlogopyte of the above localities has a hexagonal appearance, and usually occurs in six-sided prisms, with base (*o*) perpendicular to the lateral faces. Base (*o*) is uneven and bent, principally when it assumes a large extension.

One specimen from Pope's Mill (*o*) is covered with small crystals, which lie entirely in the plane of the laminæ. These crystals, though minute, can be detected without the aid of a magnifier. They are of a light-bronze color, and cross each other at an angle of sixty degrees.

The lateral sides of the prism are uneven and corroded; only in a few specimens could polished faces be perceived. Usually the lateral faces are tapering towards the base,

Thin laminæ, parallel to the base, produce, in Norenberg's Polariscopes, or in the tourmaline tongue, lemniscates, which are symmetrical on the left and right, and which differ from the symmetrical front and back. This indicates the orthorhombic system of phlogopyte.

Having no apparatus at hand to measure the angle of the optical-axial divergence, I refer to Dana's Mineralogy (1870), where it is reported as varying between 3 and 20 degrees. The optical-axial angles of biotite vary from 1 to 5 degrees. It will be seen that, in optical characters, phlogopyte and biotite, both magnesia mica, approach each other very closely, and in some special cases this will cause difficulties in their discrimination according to their optical appearance.

Quenstedt, in his Mineralogy, states that thin laminæ of biotite present, in the Norenberg's Polariscopes, an hexagonal appearance in their lemniscates, whilst thicker laminæ of the same mica give the orthorhombic one.

Thick laminæ of phlogopyte, under the micro-polariscope, polarize in a bright, yellowish color, in the darkened field, whilst thin laminæ give a very faint luminous effect.

Cleavage.—Parallel to base (*o*) considerable. On specimens which are in a state of metamorphic alteration, the cleavage is nearly obsolete. It will be

found that in such altered specimens, and principally in those which change to steatite, scarcely a lamina can be separated, which is thin enough for a microscopical examination. Its flexibility is likewise lost, as it will break to pieces by bending.

On some specimens of phlogopyte, and principally on those of Pope's Mills, St. Lawrence County, the basal plane (*o*) is marked with two systems of parallel lines of separation or cleavage, which cross at an angle of 60 degrees. Another series of parallel lines sometimes is noticeable, crossing the first two series at an angle of 60 degrees. A hexagon crystallographically regular will be formed by three pairs of the three series.

In order to show in a graphical manner these lines of separation, and also the phenomenon of Asterism, which will be discussed in the following lines, figure 1 is given: *a, b, c, d, e, f*, represents the crystallographical hexagon in its equilibrium, *ad, be, fc*, are its diagonals or axes, which all meet in the central point (*o*). They give the direction of the separation marks.

The whole hexagon being rotated in its plane for 90 degrees, will be in the position *a', b', c', d', e', f'*. Then its diagonals (*a, d*), (*b, e*), (*f, c*), will be the perpendicular axes of the first one, and the diagonals of the first one will represent the direction of the perpendicular axes of the second.

The various angles formed by the diagonals of the two hexagons, will be met with on specimens on base (*o*) as lines of separation. The directions (*ad*), (*be*), (*cf*), or (*a, d*), (*b, e*), (*c, f*), give the angles at which the small crystals or base cross each other. Figure 1 will be referred to again.

V. Reusch's Schlägfigures could be produced in some cases with unaltered laminae of phlogopyte of Warwich and Edenville, as those specimens were the least altered, having kept their former elasticity. It was found best to use a thin lamina, and a fine round point of a needle. The figures or lines caused by the quick piercing of the laminae presented a fine round aperture caused by the point of the needle around which three short lines were visible, diverging under angles of 120 degrees. These lines correspond with (*bo*), (*fo*), and (*od*), or (*b, o*), (*f, o*), (*d, o*), and if continued they would answer to the diagonals of the hexagon, or to the direction according to which laminae of phlogopyte can be separated.

The existence of an indistinct cleavage, according to those lines, in phlogopyte, can, therefore, be regarded as established.

Lustre Base (*o*) has on fresh surfaces a submetallic bronze lustre. If exposed for sometime to the air, it changes to a pearly one. The lateral faces are usually of a fatty or pearly appearance.

Color.—Base (*o*) in compact masses has usually a brownish-red, yellowish-red or brownish color.

Specimens which are wholly or partly altered have on base (*o*) a whitish, greyish color, sometimes stained with a number of dark-brownish patches, which spreading over the whole surface give to it a dendritic appearance. The lateral faces are of a brownish or greyish color.

Asterism.—Thin laminae of phlogopyte are transparent, and allow a yellowish light to pass through them.

Specimens from Edwards and Edenville, which are of a white silvery color, do not give a very sharp picture of the object looked at, and are surpassed by the brownish-red variety. The cause is in the alteration of the whitish phlogopyte, which doubtless formerly has been of a brownish color.

Rose, in his *Monatsberichten der Berliner Akademie*, 1869, drew attention to the fact that some mica has the optical property of decomposing a ray of light into six or twelve beams, when looked at through a thin lamina. It appears to the observer as if the light would throw out from its nucleus six or, in some

favorable case, twelve beams, which cross each other, in the center of the light, at angles of 60 degrees, or if twelve rays appear, at angles of 30 degrees.

The star thus produced resembles the 6+6 diagonals of figure 1, and is based upon their crystallographical direction and value. It will be observed, with twelve-sided stars, that six beams are of greater intensity, whilst the intermediate ones are less luminous. The capacity of certain mica to present to the eye this star-like figure is called asterism.

Zirkel, in his famous work, *Mikroskopische Beschafferheis der Mineralen und Gesteine*, 1871, reports likewise a phlogopyte of South Bourges, Canada, which shows asterism. Zirkel explains this phenomenon by the presence of a number of microscopical crystals which are disseminated through the mica in directions making with one another an angle of 60 degrees.

The phlogopytes of the above-named New York State localities, with the exception of that of Monroe, Orange county, present, in unaltered specimens, asterism, but in a less degree than those from South Bourges and Perth, Canada, which latter ones are of an even and smooth surface, whilst the above-named phlogopytes are uneven, bent, and partly altered.

In a lamina from Pope's Mill's, St. Lawrence county, not larger than one square inch, one part of it presents asterism, while the other altered one does not.

It is, however, difficult to determine, with a limited number of specimens of phlogopyte lacking asterism, whether this is to be attributed to a molecular alteration, or whether the phenomenon never has been present even in fresh, unaltered pieces.

The investigations which the writer has made with various micas, and other minerals, in regard to their asterism, induce him to suggest that asterism is not due to microscopical enclosures, arranged in a hexagonal direction; but, on the contrary, that the crystals, in the moment of their origin, were compelled, by the crystallographical, molecular arrangement of phlogopyte, to which asterism is due, to place themselves in a manner conforming to the crystalline architecture of the mineral. The reasons for this view are:

1. Some laminae of phlogopyte show asterism in a distinct manner, without having the microscopical crystals.

2. Some laminae of phlogopyte show asterism in six-sided beams, and contain, also, those microscopical, prismatic crystals, the direction of which is a parallel one

3. According to Zirkel's explanation, only one beam should be seen, as only one direction of crystals occurs in phlogopyte.

4. Some altered phlogopyte laminae contain those crystals, nearly unaltered, and no asterism could be seen.

5. Jeffersite presents asterism in a brilliant manner, and has no microscopical enclosures to which this optical quality might be attributed.

The phenomenon of asterism is best observed with thin laminae, holding them near to the eye, parallel to the source of the light. The size of the laminae should not be too small, as, in the latter case, the lamina has to be brought close to the eye to observe or to see it, which might lead to some deception. The light of a candle is best; observations should be made in a dark room, where only the candle-light is burning—though asterism will be shown in daylight, but less distinctly. If the laminae (unaltered) are thin, uniform, and of a large surface, a twelve-sided star will be seen, its beams being fine, distinct lines, crossing at the centre of the light, and losing their intensity towards their outer zone. In advancing the phlogopyte toward the light, the rays will appear to pass into broad lines, which taper out towards their less luminous part. The broad beams have bright lines on their borders, whilst the interior is dark, or trans-

versely striated with prismatic colors. If a thicker lamina is used, as a rule, only a six-sided star will present itself, having in its center short lines, the direction of which corresponds to the rays of the other system. See fig 1 (*ad*), (*be*), (*cf*), or (*a, d*), (*b, c*), (*e, f*).

A still thicker lamina shows sometimes only two lines, crossing each other at 90 degrees. The direction of those two lines corresponds to the lines (*b, e* and *c, f*), or to any two perpendicular to each other (figure 1).

It is the opinion of the writer that most of the phlogopyte laminae are built up in the following manner: $+ - + - + \dots$ The (+) and (—) indicate thin laminae, + being related in the plane (*o*) towards (—) for 90 degrees, which will be partly confirmed by the examination under the micropolariscope. On some laminae, the six-sided star is characterized by a stronger intensity of one of its beams.

Laminae of Phlogopyte, which were exposed for some time to a white heat, showed asterism when cooled down again. Also cold, diluted acids did not produce any change in regard to their asterism.

Hardness.—Base (*o*) usually 2.5. Lateral faces harder, nearly 3., if the streak is perpendicular to base (*o*).

Spec. Gravity.—From 2.5 to 2.90. Specimens from Orange county, as an average 2.60.

Streak.—White, grey.

Electricity.—Laminae of Phlogopyte rubbed with a woolen cloth become electric (—). In breaking them or hammering them in a dark room, a number of electric sparks will be seen.

Chemical Composition.—The following three analyses of Phlogopyte are given in *Dana's Mineralogy*:

	Si.	Al.	Fe.	Mn.	Mg.	Ca.	Na.	K.	H. F.	
Edwards	40.36	16.45	—	—	29.58	—	4.94	7.23	0.95	<i>Crawe.</i>
Edwards	40.36	16.08	—	—	30.25	—	4.39	6.07	—	<i>Crawe.</i>
Gouverneur ..	41.96	13.47	2.12	0.55	27.12	0.34	trace	9.37	—	<i>Ramm.</i>

Phlogopyte from Pope's Mills and Edwards, gave reaction of Manganase and Fluorine. The writer detected Titanium in form of menaccomite in examples from the same locality; and also stained a strong reaction of oxide of iron.

Alteration.—Phlogopyte usually undergoes metamorphic alteration to steatite. Specimens from Vroom's lake, St. Lawrence county, which have a fresh appearance, have the interior corroded and marked with patches of steatite. In specimens from Edwards, an alteration of phlogopyte to magnetite (menaccomite) goes on. The first decomposing again to hydrated oxide of iron.

Occurrence.—Usually with serpentine, limestone, and polamite. In the Swiss Alps it is found in polamite with menaccomite.

Microscopical examination.—Laminae of various degrees of thickness were mounted in Canada balsam in the usual manner. Care was taken to press down the bent lamina with the cover-glass, in order to have the whole lamina in the plane of the objective glass.

Phlogopyte of Orange county, viewed with a magnifying power of about 120 diameter, presents a clear light yellowish mass, through which various crystals and enclosures are disseminated.

The most prominent of these foreign particles consist of a number of long primastic crystals, which have been already mentioned in the lines treating of asterism, and in regard to base (*o*), Warwick county. Sometimes these crystals are so similar in color to the phlogopyte—basis itself, that they can only be detected by their outlines forming dark lines.

Using polarized light for the following observations, the crystals will present themselves as richly colored bands, and are therefore more readily detected from the phlogopyte itself, which only polarizes in various brownish-yellowish shades.

The form of these crystals is usually a parallelogram of which one pair of parallel sides has a long extension, whilst the other pair, crossing the first at an angle of about 60 degrees, is short (fig. 2). Sometimes, as it is represented in fig. 3, another pair of parallel lines occurs forming a hexagon. Fig. 4 presents a form in which the lines cross each other at 90 degrees. There are still other combinations occurring as given in figs. 6 and 7. It will be noticed in nearly all the preparations that the prisms are gradually altering in breadth, sometimes tapering to the thinnest line, which afterwards slowly assumes again its prismatic form (fig. 8.)

By means of the micropolariscope, it will be perceived that nearly all of those long-shaped crystals are not single, but are in twin position. The parallelograms present a series of colored lines and bands, arranged parallelly to the long sides of the prismatic figures. The bands are in certain relations to each other. One system will polarize most brilliantly, whilst the other presents scarcely any color.

In the Canadian mica of South Bourges, of which Zirkel has given a description in his previously mentioned work, the prismatic crystals are more frequent, but much smaller. Zirkel does not mention the occurrence of twins in those crystals. He pronounces them to be monaxial mica, lying with their bases in that of phlogopyte.

It seems to the writer more likely that these crystals are mica sections, through their lateral sides, crossing the base of phlogopyte at an angle of 90 degrees. In large phlogopyte specimens, some time even to the naked eye, plates of mica are visible, which lie with their base in the lateral faces of phlogopyte.

In regard to the position of the above-mentioned, long-shaped crystals, it will be observed that they follow a law peculiar to themselves, and of which figure 1 is a graphical representation. The crystals are placed towards each other parallel to the diagonals (*ad*,) (*be*,) (*cf*,) or (*a*, *d*,) (*b*, *e*,) (*c*, *f*,).

Figure 9 presents two crystals crossing each other at 60 degrees, and figure 10, two crystals crossing at 30 degrees.

Both prisms appear dark in a certain position of the analyser towards the polariser, whilst the part where they cross each other is luminous, which indicates that the crystals lie in various mica planes.

In figure 10 are shown two prisms at 90 degrees to each other having complimentary colors. After rotating the polarisator for 90 degrees, the colors will be reversed.

Figure 11 represents three prisms crossing at 60 degrees, which answers to the diagonals (*ad*,) (*be*,) (*cf*,) or (*a*, *d*, *b*, *e*, *c*, *f*,).

In figure 12 (*ab*), three prisms form a rectangular triangle, the ratio of the perpendicular sides being fig. 13, 1:1 or fig. 12, 1:2, as can be easily deduced from figure 1.

The second group of enclosures, in phlogopyte from Orange county, are a number of black, round or needle-shaped bodies. Figure 14, which, even with a magnifying power of 670 diameters, appears as a fine dust. They occur in zones with a dark nucleus in the center, which is a greater accumulation point of those microlites. This name was proposed by Rosenbusch for such minute bodies as are difficult to discriminate.

The microlites appear also in straight lines and curves. Sometimes they occur even in the center of the long-shaped crystals, but generally they pene-

trate the phlogopyte basis. The writer is convinced that the first cause of the alteration in the chemical and physical molecules of phlogopyte, is due to the development of these microlites. Their negative chemical affinity towards hot hydrochloric acids, indicates that these microlites are not magnetites (as was supposed by many), but most likely mepacconite.

The third group of enclosures consists of large colorless bodies, the form of which is represented in fig. 15. They occur in lines, circles, and are more frequent in biatite and muscovite. Zirkel figures a series of these strange enclosures found in European mica, and give them the name crystallites.

The examination of the phlogopyte basis in regard to its dichroism, was made by the aid of the microscope and polariser. Rotating the latter, various shades of yellowish-brown color could be seen.

In the phlogopyte of Pope's Mills and Edwards, the basal plane (*o*) is of a bronze, brown color, similar to that of Edenville; but in examining thin slices or laminae of the first two localities, we will find that the coloring-matter is not uniformly spread through the whole mass, but that it occurs in patches, formed by bronze-red microlites—sometimes with an amethystine color. The phlogopyte basis presents a greyish color, and seems to be in a changed condition, as its flexibility is partly lost, having assumed a certain brittleness. It polarizes in a faint bluish-white between the crossed nicols. Laminae of moderate thickness of Pope's Mills' phlogopyte show asterism.

The coloring matter is due to microlites, which occur in the most variegated outlines; sometimes in form of a rhombohedron of about 120° and 60° , or in hexagons of about 120° , but most of the microlites occur in very irregular and most bizane forms. Some assume a dendritic or arborescent shape; some again present a very irregular star. Another form of these microlites presents partly straight outlines of a hexagonal habitus, whilst the other part is of the most irregular shape.

Zirkel, in his *Mikroskopische Beschreibung der Mineralien und Gesteine*, pictures similar microlites as belonging to mica, specular iron ore, minerals which have greatest resemblance with those of Pope's Mills.

He describes, also, similar forms occurring in a mica, as hematite crystals, to which the Pope's Mills' microlites may belong. Treated in cold acids for a length of time, they do not show any alteration.

The color of the hematite crystals is between the lightest shade of yellow and brown-black, the color increasing with their thickness, or, as it is usually the case, with the amount of laminae which are piled upon each other. In regard to their position, no particular law seems to exist, but the writer has observed, in some preparations from the above locality, that a number of the hexagonal laminae were arranged in parallel position, the outlines of the hexagon running in three directions.

Zirkel mentions a similar occurrence of parallel-arranged hexagons in a mica of Greenville. Under the polariscope, they polarize very distinctly in brownish-red colors; even those dark-colored, which appeared entirely opaque towards reflected light, polarized in bright, dark-red hues. In regard to dichroism they appear to be indifferent.

A great number of the hematite laminae appeared to be filled up with fine, needle-shaped microlites, arranged in a hexagonal manner, but sometimes only one series of parallel lines is seen. They polarize with a strong light, but showing no colors, resembling the above needle-shaped enclosures of the Canada Mine. Their length was about 0.5 mm.

These needle-shaped enclosures should not be taken for fissures or holes of the hematite laminae, through which the white phlogopyte basis is visible. The

latter fissures appear frequently; sometimes as holes, straight lines or curves, but only polarize similar to the phlogopyte basis, which they really present.

Another form of microlites, in form of laminae, and most likely a mica, is presented and best viewed under the dark field of the crossed nicols. These mica laminae are likewise spread through the hematite microlites, and seem to form one crystal, but on account of their vivid polarization in azure-blue and yellowish colors, are easily separated from them.

Most of the minute mica scales present lines of twin-formation in such a sharp and well-defined manner, that they resemble the plagioclase-lines (lines of twin-formation), under the polariscope, and cause some doubt in regard to their being mica.

In most of the preparations of Pope's Mills and Edwards, the phlogopyte, the bronze color of the base is due to the above-described mica-hematite microlites; in all those sections seen, a want of the long band-shaped mica crystals is characteristic. They may occur in a few crystals, but polarize less intensively than those which occur in phlogopyte, the base of which is uniformly colored by a brownish, yellow coloring-matter.

The decomposition of the phlogopyte of Pope's Mills seems to be due to the presence of the mica-hematite microlite. They change into a hydrated oxide of iron, which becomes dissolved and carried away by water, which may come in contact with it.



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